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THE BRICKBVILDER

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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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IT is so much easier to see the outs than it is to appreciate the ins, that we often hear a great deal more of the objections to brick and terra-cotta as building materials than we do of their excellent qualities. The criticism, so called, which is leveled against products of this description is very apt to be limited to fault finding and invidious comparisons without any attempt to show how the best results can be obtained with this vehicle. No material which is used for building construction is perfect, and so long as human agencies are the medium through which a structure is evolved, so long will mistakes and errors of judgment occur. There are naturally, therefore, directions in which the value of brick as a material can be greatly increased and the desired results more readily accomplished. The architectural profession is an extremely critical one. By training, by association, and as a matter of self-protection, architects are forced to be conservative in their views, to take slowly to new inventions or methods, to hold fast to established ways, and to let experiments be tried by the unwary and unprofessional; while because of the retrospective character of the architecture of the present day the new forms of brick and terra-cotta sometimes receive scant favor when first put on the market, and a color or texture which does not find a precedent in the work of the past obtains slow recognition. This is in a way as it should be, and yet the spirit of conservatism which would exclude doubtful products or reject untried methods must not be carried to the extent of ignoring possibilities or of exacting more than can fairly be required of the burnt clay products. We have very nearly outgrown the spirit which would prompt an architect to discard the more finished, workmanlike products of our kilns in favor of the crude, misshapen, but finely textured brick which was so much in favor a few years ago We occasionally find instances where the rough, unfinished look is sought for and where an appearance of studied carelessness is considered to be equivalent to an artistic effect. Without undertaking to question the picturesque possibilities of an imperfect brick or a poorly burned piece of terra-cotta, we do feel, and we find this belief is quite generally accepted, that better results will be obtained in every case by the use of the best product that our manufacturers can turn out; and if it is desirable to procure such excellence of product, our architects can lend great aid by their personal encouragement of the efforts which are every year put out by our manufacturers to more fully and completely meet the artistic growth of the country. It is very easy to find fault with the size of the brick, the sharpness of the edges, or the variations in tone, but if instead of indulging such a captious spirit we would be prompt to recognize a good brick when we see it, and not only recognize it by a pleasant word spoken to the manufacturer or salesman, but to acknowledge it in the more practical method of using it in our buildings, it would be much easier in a few years to secure the uniformity of product which is so generally desired. And with this uniformity it is our belief that the artist's desire to employ the rough or crudely burned product would be very much lessened, the element of uncertainty could be handled with more precise results, and our architectural designs would be clearly expressed in a medium that we could depend upon. Good brick always costs money. Terra-cotta which is irregular in shape, imperfect in burning, and out in color is of course a great deal cheaper than the product which is firm, even, and true. We all want the latter. If the architects would insist upon having nothing but that and should not give their clients even the opportunity of electing to take the cheaper material, but consider that terra-cotta and brick always means good terra-cotta and brick, and if not always the very best the market affords, at least a fairly reliable first-class product, there would be less cause for complaint on the score of poor material, and the manufacture would be raised more nearly to the ideal of which we believe it is capable.

IN the fire proofing department of our last issue we called attention to some conditions which exist under the so-called fire-proofing laws. Since then an illustration in point has been brought prominently into notice. A building has recently collapsed in Boston under conditions which were so exasperating that it is hard to have patience with either the authorities which will allow or the statutes which will tolerate such occurrences. The building law of Boston, very wisely, we believe, provides that every building to be used as a tenement or lodging house shall be fire-proof in the first story, and that every building used under certain conditions so as to be practically a hotel shall be entirely fire-proof; but, unfortunately, the law does not apply to alterations, or, perhaps, to be more exact, the ordinance is not clear in defining the limits of what can be passed as an alteration. Boston is full of old tumble-down structures which have been used for tenement houses for years. These have been acquired quite extensively during the past decade by a class of property owners who care so much more for revenue than for a decent building that their continual increase in the acquisition of such property constitutes a serious menace to good construction, to say nothing of danger to life and limb, for the reason that these old structures when acquired, invariably undergo a species of rebuilding and repairs, and

as in nine cases out of ten the structures were orginally but imperfectly built, they are seldom improved by the alterations. In this particular instance, in order to enlarge the building and at the same time avoid the requirements of fire-proof reconstruction, the building underwent what was claimed to be a process of alteration; but as only the wall on the party line and the floor beams themselves were left intact, the elastic limit of the statute was very closely touched. Some of the walls were only 4 ins. thick, none of them were well built, and the work of alteration was confided apparently to a set of mechanics who know almost nothing about proper building, with the natural result that before the work was half completed it all tumbled into the cellar. Boston's building law is in theory a very fair one, but in practise it allows loopholes of sufficient size to permit of outrageous violations of what ought to be considered fairly good practise. There is no possible excuse for the collapse of any building. With ordinary care and a slight mixture of intelligence the most extensive alterations can be carried through without the slightest danger or risk, but with poor masonry, mortar which is nearer mud than anything else, and mechanics who are ignorant of the ordinary principles of building, coupled with an elastic interpretation of a law which at the best can only be vague in its limitations, the wonder is we do not have more accidents than really occur.

BONDING OF BRICKWORK — CORRESPONDENCE.

EDITOR THE BRICKBUILDER.

Dear Sir: — Your editorial on the bonding of brickwork, in the October issue of THE BRICKBUILDER, touches upon one of the most serious evils in American building. It is not unusual to find bad methods tolerated because they are less expensive, but it is rare indeed to find a distinctly wrong practise that is also more costly from the start. This is most emphatically true of the practise of veneering walls of common brick with "face" or pressed brick. We must now make the real burden-bearing wall of the full thickness necessary to carry the load of roof and floors and then add the 4 in. skin of face brick, bonding this to the real wall in various questionable ways that impair the strength of the backing. All of this iniquity of weak construction and unnecessary expense is due to difference in coursing of front and common brick.

I am unable to explain the origin of the numerous brick sizes, but it is fair to presume that many of the existing dimensions are arbitrary, and can, therefore, be changed without shaking the foundations of society. If the common brick would course with the face brick used in the body of the wall and were accordingly laid with bonding of header bricks, we should at once do away with the extra 4 ins. of thickness, and could consider the face as an integral part of the wall, capable of bearing its share of the imposed load. These advantages are entirely economical and constructional and sufficient to justify the changes suggested. The esthetic gain would be most desirable; we should have in the place of the characterless wall face composed entirely of stretchers, a wall diversified by the exhibition of ends of the headers, and suggesting, even to the layman, thickness and strength.

The charm of the colonial brickwork is due more to the evident bonding than to picturesque combination of the dull red brick and thick joints of white mortar. Many architects are now insisting upon the so-called Flemish bond on the face of exposed brickwork, but they are satisfied to have the appearance without the strength, as they are content to have show headers. In some of the recent work selected common brick have been used on the face of the wall, and the bonding has therefore been honest. To have real bonding between face brick and common is at present almost impossible. I know of but one satisfactory example, and this was only possible by having the face brick made of special dimensions to course with the common brick. The building referred to is the recently constructed Jefferson Hotel in Richmond, Va. As every inch of the walls could be counted upon to carry its share of load, the saving in space and in expense by avoiding the extra thickness became in this extensive building a very large item.

The consideration of this question brings us at once to another and important one, which is, the existing variation in dimensions of common brick from different districts. We should have throughout this country a uniform standard of size for common brick, and then we can logically proceed to fix upon a size of face brick which will course with it.

I hope that THE BRICKBUILDER will continue to direct the attention of architects, masons, and brickmakers to this matter.

OWEN BRAINARD.

NEW YORK CITY, Nov. 15, 1897.

EDITOR THE BRICKBUILDER.

Dear Sir: — According to your invitation in the October number of your highly esteemed paper, regarding improvement on American bond, I will submit to your readers the practise I have followed for some time; a simple method which not only gives no additional work to the mason, but also very little trouble to the brickmaker.

I am using for headers, bricks 8 ins. square. This allows for a perfect, uniform bond, and does not limit you to a header every sixth course only.

This system has especially great advantage in building with hollow bricks, where one is obliged to use solid bricks for headers.

The square bricks are very handy on corners, and I have found that the masons save much time by using them.

I am sure every brickyard will be willing to furnish them along with the ordinary size, as they represent virtually two bricks.

GUSTAV LIEBAU.

MAURER, N. J., Nov. 2, 1897.

PERSONAL, SOCIETY, AND CLUB NEWS.

THE designs of Carrère & Hastings, submitted in competition, have been selected for the new Astor, Lenox & Tilden Public Library Building, New York City; also for the new building for the National Academy of Design, which will be located on Bloomingdale Heights, New York City.

E. R. DUNLAP, architect, has opened an office at 32 School Street, Pontiac, Mich., and would be pleased to receive catalogues.

THE Detroit Camera Club held their annual fall exhibition of photographs in the east galleries of the Detroit Museum of Art, Thursday, Friday, and Saturday, and Saturday evening, November 18, 19, and 20.

THE second annual exhibition of the Society of Western Artists was opened Thursday evening, November 18, at the Museum of Fine Arts, 19th and Locust Streets, St. Louis.

THE Illinois Chapter of the A. I. A. and the Chicago Architectural Club have made arrangements for a course of five lectures by Prof. William Henry Goodyear, of the Brooklyn Academy, on Greek, Roman, and Syrian architecture and archeology. The first lecture will be on horizontal curves and other optical refinements in Greek architecture (including recent photographs of the curves in Sicily and at Pæstum and in the Maison Carrée at Neims). Topics for the remaining lectures will be announced. The lectures will be given in the North Lecture Room (first floor) of the Art Institute on Thursday evenings at 8.15, November 18, December 2, 9, 16, and 23.

A REGULAR monthly meeting of the "T Square Club" was held on Wednesday evening, October 20. This was the first meeting held by the club in its new house. For some time past the club has been without a home, holding its meetings in the offices of the various architects, who have kindly extended their hospitality to their fellow-members. This, however, was always considered a merely temporary arrangement, and the executive and house com-

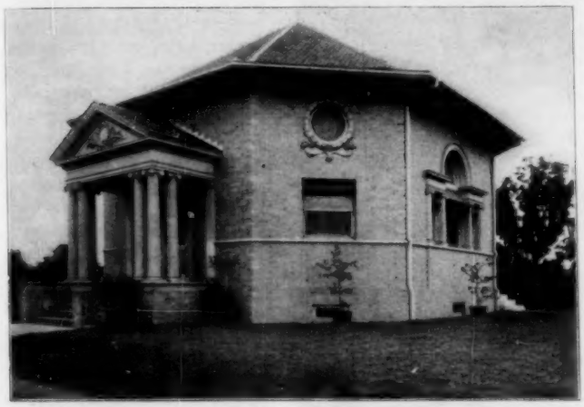
mittees have been active in their search for suitable quarters, and now feel that a place has been secured as nearly ideal as is possible under existing conditions, having rented on a five years' lease an old stable, the ground floor of which has been sub-let as a carpenter shop, the club retaining the two upper floors for its own use. The upper floor has been converted into one large room 30 by 35 ft., where the club will hold its meetings. Five casement windows extend all across the front and three at the back. A generous brick fireplace has been built at one side, and the walls and ceiling are lined with wood of a dark color. Very little was necessary to be done to this place, with its sloping ceiling and general Bohemian air, to make it a cozy home, and just what all the members have wanted so long.

ILLUSTRATED ADVERTISEMENTS.

THE New York Architectural Terra-Cotta Company send us a view of the Samuel Ready Memorial Library, Baltimore, of which Messrs. Wyatt & Nölting, of that city, were the architects.

The Excelsior Terra-Cotta Company show in their advertisement on page iv, two figures executed by them for the Smith Building, Market Square, Washington, D. C.; T. F. Schneider, architect.

Number 5 of the series of brick and terra-cotta fireplace mantels, which is being illustrated in the advertisement of Fiske, Homes & Co., page vii, is one designed by J. H. Ritchie and modeled by Tito Conti, the drawing being by H. F. Briscoe.



SAMUEL READY MEMORIAL LIBRARY, BALTIMORE.
Wyatt & Nölting, Architects.

The New Jersey Terra-Cotta Company illustrate in their advertisement on page viii, the new Ninth Precinct Police Station, New York City; John DuFais, architect.

The Probate Court Building, Cambridge, Mass., Olin W. Cutter, architect, is illustrated in the advertisement of the Fawcett Ventilated Fireproof Building Company, on page xii. The illustration shows the building in course of erection.

The residence of Theodore Hooper, Esq., at Baltimore, Md., of which C. L. Carson is the architect, is shown in the advertisement of the Harbison & Walker Company, on page xxv.

Charles T. Harris, lessee of the Celadon Terra-Cotta Company, begins this month, in his advertising page (xxix), a descriptive series of the various patterns of roofing tiles manufactured by his company. A new series of tiles will be illustrated and described each month, and many valuable directions and suggestions regarding the use of tiles will be given.

"Examples of Bond" is the title of a new series of illustrations begun in this month's advertisement of the Gilbreth Seam-Face Granite Company, page xxxviii. It is the purpose of the company to illustrate a number of styles of bond, employing the various sizes and shapes of their seam-face granite blocks.

PERUZZI'S CAMPANILE AT SIENA.

BY W. P. P. LONGFELLOW.

THE southern part of Tuscany, over which Siena used to rule, is curiously destitute of building stone, considering that it lies between the rocky Apennines and the marble hills that border the Mediterranean. But it is a broken, ridgy land, built of marl and clay, and rising into innumerable hills on which the towns are perched, which almost forbids their inhabitants to use building stone, to be dragged over many miles of hilly roads, up long valleys, or over rough ridges, but which furnishes everywhere good material for brick. In medieval times, when roads were bad, the carriage poor, and when every few leagues of the way brought one into a new country, and usually a hostile one, the transportation of stone to a town so placed was almost prohibited. Siena was, till the days of the Renaissance, almost entirely a town of brick. It was built of brick, walled with brick, paved with brick. The Tolomei Palace of gray sandstone is conspicuous among the buildings of the thirteenth and fourteenth centuries by its unusual material. The Grotanelli Palace and the Marescotti, now the Saracini, have lower stories of stone with brick above; but the Palazzo Pubblico, with its wonderful tower, the Buonsignori and most of the older palaces, the famous old fountains, the great churches of San Domenico, San Francesco, the Carmine, the Osservanza, the Servi, and all the older churches, are of brick. Broad, irregular flagstones have displaced the brick pavements in the streets, which are recorded as late as the seventeenth century, but the great central piazza, the famous Campo, still keeps its funnel-shaped brick flooring seamed with radiating gutters of stone, and looking not unlike a huge cobweb.

The brickwork which suited the pliable Italian Gothic of the fourteenth century did not lend itself so easily to the more rigid style of the Renaissance. It is a characteristic but stubborn material which demands sacrifices from the style that is to be embodied in it, or else insists on its right to generate a style of its own. It is contemptuous of fractions of an inch, and even of inches. When it is called on to adapt itself to a style of minutes and modules in which surfaces and moldings are adjusted to centimeters, and perhaps to millimeters, it refuses, and if the designer persists it makes him no end of trouble, and is apt to spoil his work. The use of terra-cotta, the natural adjunct of plain brickwork, did not develop in Tuscany so luxuriantly as in Lombardy, nor did it prevail much in the later style. By the time the Renaissance was brought in bodily from without, the building of the splendid cathedral in marble, with a richness and delicacy of detail before unknown to the Sienese, had revolutionized their ideas of the elaboration of architecture. The artists who brought it, dainty in their choice of material as of forms, naturally chose to execute their works in stone rather than brick. The Piccolomini Palace, and the Loggia del Papa, built for Pius II., the Sienese pope of the Renaissance, set a new fashion of building in stone, which the nobles or communities that built new buildings after these followed as they might, in the Spannocchi Palace, for instance. But the day of Siena's glory was passed. Not a great deal was added to her architectural beauty after the plague of the middle of the fourteenth century had finished the desolation that ceaseless wars had begun. The religious communities which raised a few great churches when the city had somewhat recovered were not rich enough to build expensively. They made structures of brick, which had to be big to accommodate their worshipers, but were for the most part rather rude, with little attempt at finished architecture, at least on the outside.

There is a marked exception, however, in some of the work of Baldassare Peruzzi, which does not aspire to stone but is built of plain brick, yet with a care in design and a certain distinction in detail that are most characteristic of the man, and set his work apart from the rest. Peruzzi was in reality a Sienese, whether he was born in Siena, as seems probable, or brought there an infant from Volterra, as Vasari tells us. If he came, as Vasari says further, from a noble

family of Florence, driven by the quarrels of their fellow-citizens to emigrate to Volterra, this may account for the air of quiet distinction and refinement which characterizes his architectural work, and which, we are told, when all the world was fleeing from Rome after its capture by the Constable de Bourbon, led the Spanish soldiers to take him for some great dignitary in disguise, and to hold him for a high ransom. In Siena he grew up among goldsmiths and painters, in the stimulating atmosphere of the early Renaissance, and by the time he was twenty years old had become a skilful painter. Mural painting was then his work, and having formed his style under the influence of both Sodoma and Pinturicchio he presently drifted to Rome, which had already become the attractive center of all artists. There, falling under the powerful spell of Bramante, he turned to architecture, and became a zealous student of ancient Roman buildings.

Peruzzi belongs to the second generation of Renaissance architects (if we count Brunelleschi, Alberti, and Michelozzo as the representatives of the first, and assume the third to begin with Vignola), among whom are Bramante, the Sangalli, Raphael, Baccio d'Agnolo, Cronaca, and Michael Angelo, and of them all he was perhaps the one who was most thoroughly master of his profession. Whether or not he possessed that power of magnificent conception which enabled Bramante and Michael Angelo to revolutionize the architecture of their day he had no chance to show, for he did not have the great opportunities that fell to them, though his designs, preserved in the gallery of the Uffizi in Florence, and by his disciple Serlio, show power and grandeur as well as skill. He was by his position a successor and follower rather than a leader. His finished works as they remain to us are rather small and simple, excepting the grand but little known Cathedral of Carpi, which, though doubtless his design, was certainly not carried out by him. The Farnesina Villa and the Massimi Palace in Rome are the best known. But there is on them the mark of distinction and of secure control of all the elements of his design that set them apart from the works of his predecessors and contemporaries. Balancing quality against quality, he is deservedly set beside Brunelleschi, Bramante, and Michael Angelo, among the greatest architects of the Renaissance. His works are the first that show a sense of proportion in all their parts, a power of combination, relation, and harmony, and a firmness of profiling and adjustment of detail that make him seem, in comparing him with his fellows, the first thoroughly accomplished architect of the new movement, and one whom in the skill of his profession hardly any of his successors equaled. After he fled back to Siena he was always busy there till he returned to Rome for the last year of his life. The fortunes of Siena had waned, and his work there gave him no great opportunity: so far as it was large in scale it was mostly in modest brickwork. The fortifications of the city occupied him; he planned the convent of the Carmine, and also, it is said, that of the Osservanza outside the city. The charming little courtyard adjoining the house of St. Catharine is his, and various decorative works in the interior of the Cathedral and other churches. The tower which he added to the Church of the Carmine, and which I have to describe here, is a very characteristic example of his qualities, and of his unflagging care even in his most modest work. It is, for all its simplicity, one of the finest of the Renaissance campanili, as it is one of the earliest.

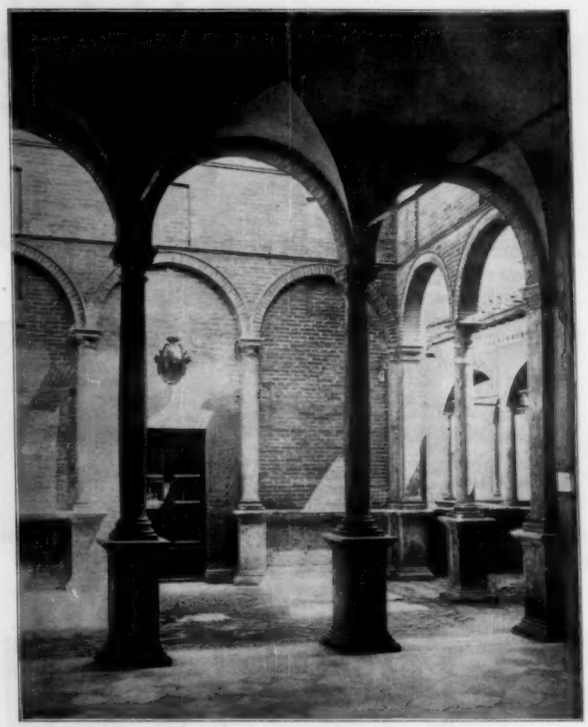
PERUZZI'S TOWER, SIENA.

This tower is a striking piece of really delicate design in brickwork, and bears such marks of Peruzzi's peculiar command of fine proportion in all details as well as in masses, that it would be difficult not to accept the tradition which ascribes it to him. I know of no other piece of brick detail in Siena which can be classed with it. Of the lower part, below the eaves of the nave, I have no photograph, and unfortunately no notes. The upper part, which shows conspicuously above the low roof, consists of two square stories and a low octagonal cupola. Each story is decorated with, or practically consists of an order of pilasters, one at each corner, enclosing on each face a high arched opening, which makes belfry stages of the stories. In the upper openings bells are hung. Every detail is in brick: there is not a line or scrap of stone or of terra-cotta in the whole. Even of molded bricks the forms are few, very simple, and very sparingly used; there are only the cymatiums of the cornices, a quarter-round and a cavetto for their bed moldings, the echinuses of the quasi-Doric capitals, and apparently — I am not quite sure of this — their neck moldings. All the rest is of plain, square-edged brick, yet the design is neither bald nor rude, nor yet inarticulate. All desirable detail is there; the proportion is so finely adjusted, the relief so delicate and yet so firm, the emphasis so well bestowed, that the tower has the effect of a finely treated design in wrought stone, and an air of elegance which it is very rare to find in pure brickwork.

This campanile is worth a careful study in detail; it is to be wished that some trustworthy student would make complete measured drawings of it for the sake of the lessons it has to teach, which can be set forth only by recording with precision the graduated measurements of the detail. The lower story is a little larger in scale than the upper, perhaps a seventh higher, a trifle broader, the pilasters a little heavier, so that it looks more massive, as it ought, while its proportion is in reality somewhat slenderer. The bricks are laid with a precision that would shame most modern bricklayers, and would

seem to indicate that Peruzzi carefully watched the building of the tower, as no doubt he did if he was at hand. The upper pilasters are accurately centered over the lower, their shrinkage being just enough to set back their plinths and the dies of the pedestal course into line with the frieze and architrave beneath. The openings in the upper belfry are not perceptibly wider than those below, so that the shortening of the story makes them appear wider, and the upper story looks accordingly more open. An oval bull's-eye set over each end, perforating both frieze and architrave and interrupting the molding that divides them, looks curiously intrusive, but nevertheless adds a touch of lightness to the upper story that could not well be spared.

Comparisons of the details of the two orders show significant differences. The entablatures are higher than the classic proportion, being about a third as high as the pilasters, which are again heavier than the classic,— a marked departure from the habit of Peruzzi's great predecessors. The upper entablature, really a little lower than that below it, is a little higher in proportion, and the cornice, being designed with block modillions while the other has dentils, is more imposing, and fills the office of the principal cornice, though its dimensions are actually less. Moreover, all the detail of the lower entablature, and indeed of the whole lower order, is lighter and finer than that of the upper, notwithstanding the larger scale of the order itself. The moldings of the cornice are subdivided, and so are also those of the caps and bases of the pilasters. This makes the lower order look a little petty, perhaps, but it enhances the importance of the upper. A curious detail is that while the impost band of the lower order is flush with the pilasters, and so breaks their inner lines, that of the upper is withdrawn from the face just enough to keep the lines there, with advantage to the effect. It looks as if Peruzzi, watching the tower as it went up, had noticed the effect below and had seen how to improve on it above; and it is possible that in the same way he got a lesson of simplification for the upper order.



COURT OF ST. CATHARINE'S HOUSE, SIENA.

The only unsatisfactory details are the keystones. While the motive of each story is the Roman triumphal arch, the brick orders being made heavier than in Roman examples, the arches are proportionally smaller and drop farther below the architrave. The archivolts, therefore, do not touch the architraves, and the keystones are considerably lengthened; but these last being proportioned in width to the span of the arches, are thin and lank, and are only half redeemed by the bands between the panels which occupy the spandrels.

The cupola is adjusted to the tower with admirable grace. It does not parody on a less scale the proportions or motives of the belfry, or echo its function, as is often done; but is composed of different and simpler elements, and so adapted to the upper story as to ally itself closely with it, forming with it, as it were, a single feature, increasing its predominance, and crowning the tower with a singularly graceful outline. It is a low octagonal cupola, a little less in diameter than the square shaft beneath, with square paneled walls pierced by rectangular windows, crowned by a plain entablature, and bearing an octagonal dome. Small scroll buttresses, set against the diagonal faces, fill the angles of the square below at the junction. They are not of beautiful outline, but make the difficult transition from the octagon to the square with unusual elegance. The curves of the dome are circular, making its section a pointed arch and so considerably higher than a hemisphere, but truncated and terminated at the top by an *amortissement* or bulbous finial of ogee curve which is still of brick, but ends in a ball that may be of metal or stone. The eight faces of the dome are broken by plain panels very slightly relieved, the only relieved panels in the tower.

The proportion and subordination of the design are almost perfect, the outlines very elegant, the distribution and adjustment of the detail masterly. There is a gathered richness and focusing of detail in the crowning parts, where it is most effective without sacrifice of the pervading simplicity and without crowding, which is more difficult to achieve than many architectural designers imagine. To be sure, the scheme of design lacks that splendid effect of contrast between the tall, plain shaft and the rich belfry that we admire in some of the Italian campanili, both medieval and Renaissance, in the tower of the Palazzo Pubblico, at Siena, for instance, and at Venice in the Campanile of St. Mark, and in Palladio's Tower to San Giorgio Maggiore (in Isola), but of its type there is none better. We seem to see the master hand of Peruzzi in the free and yet consistent way in which the orders are handled, and especially in the sure and fine gradation of all the measures and reliefs, in the scrupulous adjustment of every detail to its own place and to the whole. Finally, it is a rare example of a classical design skilfully adjusted without compromise to simple brickwork, a material which in ordinary hands has shown itself intractable for such a use.

There is another small work of Peruzzi in brick which deserves mention here for the same qualities that we see in the tower of the Carmine,— the façade which was added from his designs to the old cathedral, called the Sagra, at Carpi. The little old Lombard building, outgrown by the town and standing annoyingly in the way of the big palace which the ambitious Alberto Pio had undertaken to build in the new fashion, was yet too sacred to be absolutly displaced; so Alberto had it razed down to its choir, and sent from Rome a design for a simple brick front which he got from Peruzzi, we are told. It is curious to see that it shows the characteristic motive which Palladio employed later at Venice in the churches of the Redentore and San Giorgio Maggiore, and which is usually considered his property,— the use of two interlocking orders, a high one on pedestals for the nave, and a lower one without pedestals for the front of the aisles. This narrow front has but one inter-columniation each for the nave and the aisles, giving three bays and four pilasters taller and shorter. A wall arch of little projection fills the head of each bay; the old marble doorway, piously preserved beneath, an unfinished pediment at the top of the nave, and half pediments on the aisles, and round panels in the tympanums, finish the design.

THE AMERICAN SCHOOLHOUSE. I.

BY EDMUND M. WHEELWRIGHT.

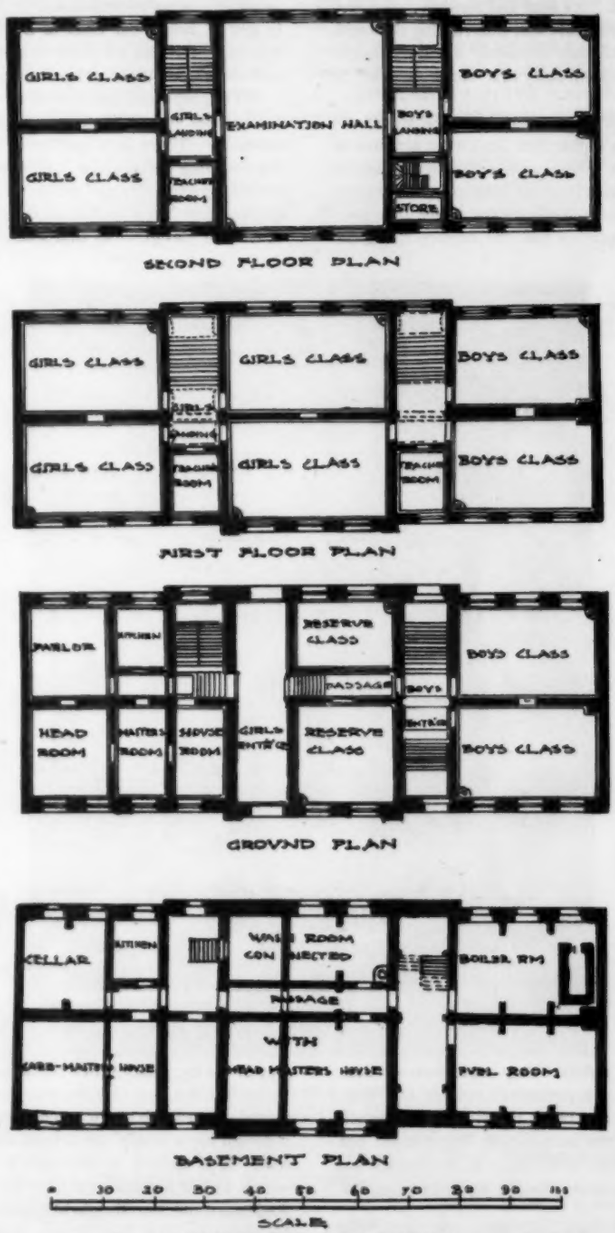
AS in all matters pertaining to public education, the Germans have made very scientific study of school planning. While certain considerations which are given deservedly careful attention by us are little heeded in Germany, in important points of planning there is much in the plans of German schools which is immediately suggestive for our own needs.

The system of instruction in France and England differs so widely from that generally adopted in this country that, although points of interest and suggestion are not lacking in particular schools, there is in their plans little of important and general suggestion for us.

The German method of instruction in primary and secondary schools is mainly, as with us, by the separate graded class system. Especial instruction in drawing, music, etc., is given in special class rooms assigned for these studies, but no assemblying of a whole school for purpose of collective instruction enters into the German system. There are, therefore, no large Assembly Halls provided in German schoolhouses, as is the case in American and English schools. Although German schoolhouses have fine and richly ornamented halls, they are not used for the regular exercises, but only on state occasions and for examinations. The Assembly Hall, with us, is not the important feature of the school, as it is in England. We use it only as an accessory to the schoolrooms. In our schoolhouse plans the Assembly Hall is usually placed, as is the German Aula, in the upper story of the building, and both are designed to be of ready access from all parts of the schoolhouse. The different uses of these halls in the two countries appear in their decorative treatment. With us the Assembly Hall has commonly but little more architectural pretension in its fittings than have the schoolrooms; indeed, it is practically but a larger schoolroom, while in Germany the Aulas are often given a rich monumental treatment, as if to be representative of the dignity of the State.

We find, therefore, the German schoolhouse closely resembling in plan the American schoolhouse as it is at present developed; the main consideration of the plan in each being to give conveniently disposed and well-lighted schoolrooms, giving off well-lighted corridors, and a large hall placed in the upper story of the building.

A few points of difference between the customs of the two countries give variations in plan of secondary importance. In Germany, nothing like coeducation of the sexes exists, and consequently in the plans the division between the sexes is made absolute; and this division is not, as with us, almost entirely confined to the basement of the building.



PARISH SCHOOL, BERLIN, PRUSSIA.
From Rolson's "School Architecture."

The importance of good ventilation and freedom from bad odors appears to be more generally recognized in this country than in Germany; consequently, we have in our later schools developed more highly than the methods of ventilating, and we have in our best schools excluded the outer garments of the scholars not only from the schoolrooms but from the hallways. American schoolhouses of the first class are now planned with separate rooms called "wardrobes" or "cloak rooms," one for and immediately adjoining each schoolroom. In Germany, the outer garments are hung on pegs in the schoolroom.

On the other hand, possibly on account of the proverbially bad eyesight of the Germans, the subject of proper lighting of schoolrooms is given more careful consideration among them than with us.

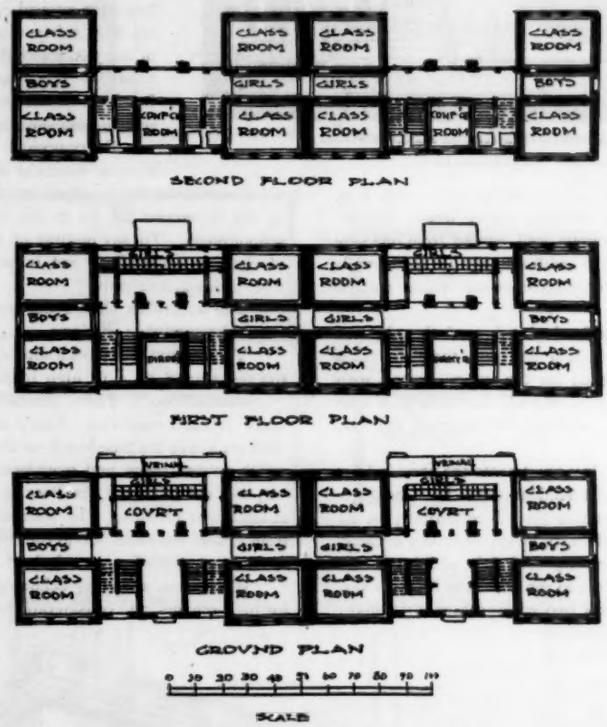
A German schoolroom is either lighted from one side only or from opposite sides. The teachers are not forced to face windows, nor are the pupils subjected to cross light. Schoolrooms are almost invariably arranged so that the principal light comes from the left-hand side of the pupils. But where our classrooms give 12 to 16 sq. ft. of floor surface in a schoolroom to each pupil, in Germany the most liberal area is 10 to 12 sq. ft. for each scholar. This is a consideration immediately associated with the question of proper ventilation, and should not be disregarded in the consideration of the advantages and disadvantages of the schoolroom plans of the two countries.

The schoolroom, 24 ft. (with 12 ft. stud) for primary schools, and 28 ft. (with 13 ft. stud) for grammar schools, generally adopted in this country requires, to give sufficient light to the row of desks next the inside wall, that there should be windows in the wall on the left and in the wall at the back of the pupils. While cross light is disadvantageous for the pupils' eyes, the chief disadvantage of this method of lighting is possible injury thereby to the

teacher's eyes. In no well-planned court room are windows placed opposite the bench, and equally valid objections hold in regard to placing a row of windows, except those with northern exposure, opposite a teacher's table.

It is held in Germany that in a schoolroom lighted from one side only, the row of desks furthest from the windows should not be at a greater distance than once and one half the clear height of the room. While this rule is not, however, followed in all cases, in Germany and France 21 to 22 ft. is the customary width of a schoolroom. The maximum length of a schoolroom in these countries is usually 30 ft. This length is the distance to which the average voice can throw with ease, and it places the pupil in the row farthest from the teacher where writing upon the blackboard behind the teacher's desk can be distinctly seen.

Another consideration in the adoption of a narrow width of schoolroom is the economy of construction permitted by this span as compared with the cost of wider spans; but in Germany, as the number of pupils to a schoolroom, except in the upper grades, is no less and sometimes greater than with us, the pupils in a German school are given a smaller allowance of air space, and do not have the advantage of separate desks such as are now almost universally assigned to pupils in our schools. As far as the scholars' wellbeing is concerned, there is disadvantage to them from cross light, but the great width of the schoolrooms required for the diffusion of light from the windows at the back of rooms gives greater air space per pupil than is given in Germany. It is undoubtedly better to have the light from two opposite sides of the room, or, as would commonly be the case, from the left side of the pupils only. The crowding of fifty-six pupils now seated in grammar schools in schoolrooms 28 by 32 ft. into rooms 22 by 30 ft. is inadvisable.



PRIMARY SCHOOL, DRESDEN, SAXONY.
From Rolson's "School Architecture."

The question of adopting a smaller-sized class room in our schools should be considered as one of economy in its broadest sense. A schoolhouse with schoolrooms 22 or 24 ft. in width can be more economically constructed than can one of 28 ft. wide. The eyesight of teachers and pupils would be better conserved in the narrower rooms.

It is for educators to decide whether the lesser number of pupils under each school teacher means greater average progress for each pupil. If so, it is possible that as many pupils per teacher may receive instruction during a term of years under the small class system as under that which now usually maintains. The economy of a system of education would seem to depend not so much upon the number of pupils per teacher receiving instruction upon a given day as upon the average rate of progress of the pupils during a term of years. Smaller classes would admit of greater care in the training of the individual scholar, and under such conditions the rate of progress of the average pupil would probably be considerably increased. Unless the number of pupils per class room in Grammar and High Schools is materially reduced, our schoolrooms cannot be planned according to the most scientific method of lighting, nor can the only weakness of the American schoolhouse plan, as compared with that of Germany, be removed, and consequently no radical improvement can be made in the general plan of our best designed schools. Of course the opportunity for improvement in details of fittings, in beauty of external effect, and in the domestic engineering, is limitless; but as far as general plan is concerned, the module given by the schoolroom for fifty-six grammar grade pupils seated at separate desks prevents no possibility of better combination and arrangement of rooms than have already been made by our best architects.

It is to be hoped that some progressive school board will try the experiment of building a large grammar school designed for classes of forty or forty-eight pupils, and adopt a system which will make rapid promotion in the grades possible. The economy of the small class system can thus be tested on a sufficiently large scale, and for a long enough period to draw reasonable conclusions from the experiment. We should not recede from the system of individual desks and ample volume of air, in which we are superior to the Germans, but we should not rest content with a system of classification which necessitates defective planning as far as light is concerned, if another system is reasonably economical.

If the system of smaller classes should prove to be somewhat more expensive in cost of teacher per pupil per school day, it should be borne in mind that to the credit of the smaller class room is to be placed the interest of the saving on cost of buildings in which the floors, especially in the case of fire-proof construction, are of short span. It would not be surprising if the result of such an experiment would show that the small class system would give as clear gain after duly weighing the other considerations in their economical aspect, the lessened strain on the eyesight of both children and teacher, and the more individual education of the children.

Large primary school buildings for the Elementen Schulen of twelve to fourteen rooms, such as are adopted in Berlin, even if built for small classes, would almost certainly prove to be more economical than the construction of four and six room primary schools. The smaller buildings are more expensive per pupil than larger buildings in cost of land and building, as well as in heating, and, if properly cared for, in janitor service.

Primary schoolrooms, 24 by 32 ft., with a stud of 13 ft. 6 ins., while they would not fully meet the theoretical requirement of width of one and one half times the clear height would be well lighted with windows on one side only and would give seatings for fifty-six scholars. A better lighted primary schoolroom would be one 22 by 32 ft., 13 ft. stud and with desks set six in the width and nine in the depth of the room. This would require aisles as narrow as convenience will admit, say 18 ins. between desks and 2 ft. 4 ins. adjoining outer wall. The loss of two desks necessitated by this arrangement would appear to be a slight objection in comparison with the better lighting acquired.

114.—IMPERIAL GYMNASIUM, VIENNA. THE AULA, OR EXAMINATION HALL.
From Rolson's "School Architecture."

A grammar grade schoolroom 24 ft. 6 ins. by 32 ft., 13 ft. 6 in. stud, while not as narrow as the German theory would require, would give seatings for forty-eight pupils, well lighted from one side only. A better width would be 22 ft., with seatings for forty pupils of the grammar grade. The stud of these narrower rooms may be 13 ft.

To illustrate the effect upon school planning of the adoption of the narrower schoolroom lighted from one side, the floor plans of a grammar school recently designed for the city of Boston, with schoolrooms 28 ft. wide, may be compared with that of a plan with the same distribution of rooms, but adapted for improved lighting, with rooms 22 ft. in width.

In the large German schools living apartments are provided for the janitor, and in some cases for the head master. Such arrangements would appear to be objectionable for all concerned; at all events, they do not commend themselves for adoption in this country.

Schoolhouses should, if possible, be provided, in addition to the main entrances, with outside entrances to the basement for each sex, and there should never be less than two entrances on first floor. Where the conditions of the building admit, there should be an ample porch provided at the entrance to shelter the early comers who cannot gain admission to the building. The entrance doors should open outward to prevent possibility of disaster in case of fire or panic. The vestibule doors should be hung with double swing spring butts. The main corridors should be of ample width, not less than 10 and preferably 12 ft. wide, and should be thoroughly lighted. Fire protection by tinned doors, making it possible to shut off the staircases on each floor, is a desirable fire and panic precaution. It is very important that there should be such fire doors to shut off the basement, and that these doors should be fitted with spring butts or door checks.

An entrance with runway and storage room for bicycles is to become a necessity in modern schools.

The staircases should be of iron throughout, the treads fitted with rubber mats, or, better, with some one of the recently introduced combined lead and steel treads. Both rubber mats and lead treads should be set in a sinkage cast in the iron tread. The lead treads need not exceed 5½ ins. in width. The staircase risers for primary schools should be 6 ins. high, and in other schools they should not to exceed 7½ ins.; the balusters and posts of iron of plain pattern, and the hand rails of each of plain round section. There should always be wall rails except at platforms.

Staircases are required in Boston to be at least 5 ft. in width. Some authorities consider that such staircases should not be wider than to admit of the comfortable passage of two files of children, each thus having a hand rail; and therefore that they should be but 3 ft. 6 ins. wide, to prevent the possible crowding between the files in case of panic. The excellence of the discipline of our school children has been proved during alarm of fire, and therefore we may safely retain the comfort and convenience of the 5 ft. stairway. There should not be more than fifteen or less than three risers between landings. Landings should be at least 4 ft. between steps. No schoolhouse should have less than two stairways.

Every primary and grammar schoolroom should have a wardrobe or cloak room adjoining it. The practise of using the corridors for cloak rooms is highly objectionable, as the movement of air in the building is naturally towards the schoolrooms. To say nothing of the danger from disease, the mass of clothing, especially if wet, is one of the main causes of the offensive "schoolhouse smell."

The wardrobes should be carefully heated and ventilated, and should have outside windows.

The hat and coat hooks should be set on side walls only, and the top row should be 4 ft. high in primary schools, and 5 ft. high in grammar schools. There should be at least 30 ft. of hanging space in each wardrobe. Every wardrobe should be fitted with a shelf set above the baseboard, or above the upper row of hooks upon which rubber boots and overshoes may be ranged in orderly manner, and not left upon the floor to be kicked about by careless or mischievous urchins. The wardrobe should have two doors, one from the corridor and one to the schoolroom. Four feet in the clear is the least width for a wardrobe.

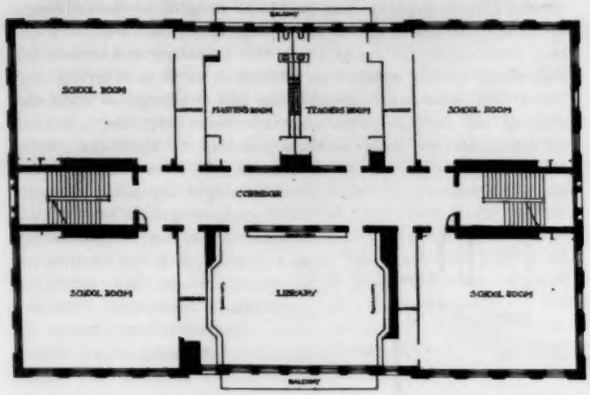
Wardrobes adjoining schoolrooms are not absolutely requisite for high schools, and considerable economy may be effected in these

BOWDOIN DISTRICT GRAMMAR SCHOOL, BOSTON.
Edmund M. Wheelwright, City Architect.

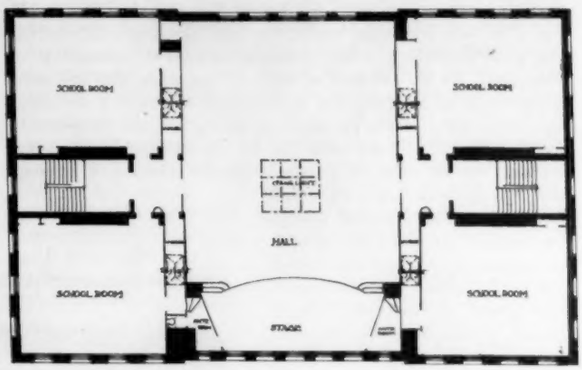
buildings by providing well-ventilated and lighted lockers in the basement adjoining the toilet rooms. These lockers should have panels of stout wire netting, top and bottom, in the doors, and may well be provided with floors and top of wire netting.

As noted above, the standard size of a primary schoolroom, to accommodate fifty-six pupils, is 24 by 32 ft. and that for grammar schoolrooms with 12 ft. stud, 32 sq. ft. of light for each window is the minimum requisite size, and that of grammar schoolrooms is 36 sq. ft.

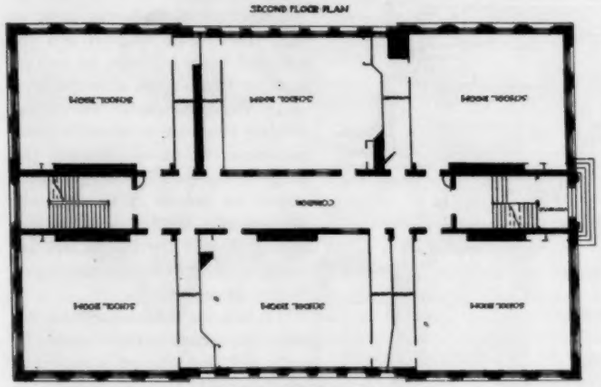
It is desirable that schoolrooms should have double run of sash. The heating system where double sash is used is more effectively and more economically run, and both the dust and the noise from the street is lessened. The expense of double sash is considerable, not only on account of the additional sash, but on account of the greater thickness of brick wall required.



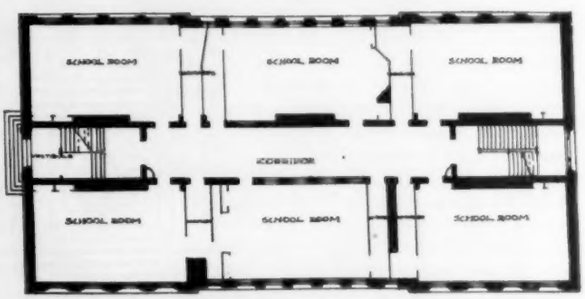
SECOND FLOOR PLAN



THIRD FLOOR PLAN



FIRST FLOOR PLAN.

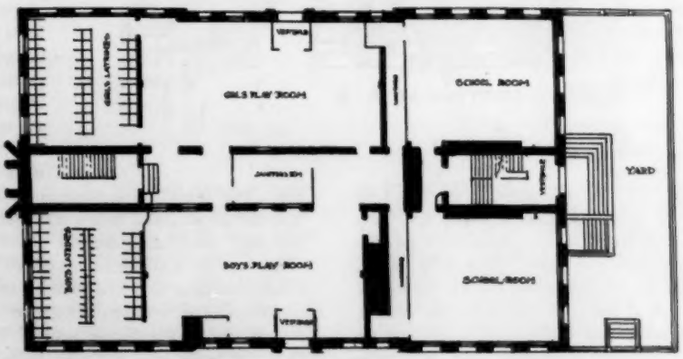


PLAN SHOWING NARROW SCHOOLROOM, LIGHTED ON ONE SIDE ONLY.

schoolroom is 28 by 32 ft.; the pupils are seated so that the principal light comes from the left, and to give the requisite diffusion of light in such rooms there should be four windows on the long side, and, unless some requirement of design or plan prevents, three on the other side.

When light comes from the north only, it is not held to be objectionable in Germany to place the pupils with their backs to the light.

The windows should be 4 ft. between jambs, 3 ft. above finished floor, and carried within 6 ins. of the ceiling. The windows should not have transoms, as the transom bar cuts off most valuable light. Narrow windows with mullions are not as good in a schoolroom as wide windows widely spaced. Arched windows should be sparingly used in schoolrooms, and only those of the upper story; when used, the stud of room and height of window should be increased so as to give at least the minimum glass surface noted above. In primary



GROUND FLOOR PLAN.
BOWDOIN DISTRICT GRAMMAR SCHOOL, BOSTON.
Edward M. Wheelwright, City Architect.

Unless the site is on a steep slope it is requisite that all the basement windows should not be less than 4 ft. 6 ins. high.

In lecture rooms, laboratories, and rooms for manual training and cooking, there is no objection to cross lighting, and windows may be placed without regard to the side lighting advocated above.

A platform 10 by 5 or 6 ft. should be provided for the teacher; this should be movable, as many teachers prefer not to have an elevated seat. An ample wardrobe for the teacher, and bookcase set with faces flush with the wall where practical, should be placed adjoining the teacher's desk. The wardrobe should be about 1 ft. 4 ins. in depth, the bookcase 12 ins. Both should have doors and should have cornices on line with that of blackboard.

Architectural Terra-Cotta.

BY THOMAS CUSACK.

THE four Chicago examples of terra-cotta cornice construction furnished by Mr. W. L. B. Jenney, and published in the June issue of THE BRICKBUILDER, have been studied in the light of the description and directions that accompanied them. Construction and commentary were alike interesting, and will, doubtless, prove useful to those for whose benefit they were prepared; and to that end, given publicity in a duly recognized channel of professional information. As an evidence of this we can state that the chief draughtsman of a leading firm of architects — himself a very capable constructor — makes no secret of having adopted the principle contained in one of these examples, for the construction of similar cornices, one of them on a very important fifteen-story building now in progress in New York. Said cornice has already passed through the hands of the writer, in the ordinary course of business; and though it is not altogether what we should have advised, its execution is simple enough, and the result will be found quite satisfactory. We have, however, profited much during a life of some activity, by the interchange of ideas; and as Mr. Jenney — in common with all other successful members of his profession — appears to set some store on the opinions of practical men, we offer, in return, a short criticism and a few suggestions from their point of view. This we shall try to do frankly, but with the deference due to one who, first in many things, was the first to catch an almost prophetic glimpse of the possibilities of the steel skeleton, which, in little more than a decade, became generally accepted, and gives promise of a yet fuller development. Not shrinking from the crucial test of his theory, he at once set about the practical fulfilment of his own prediction, in the outcome of which it may be said — in this case at least — that the prophet is *not* "without honor in his own country."

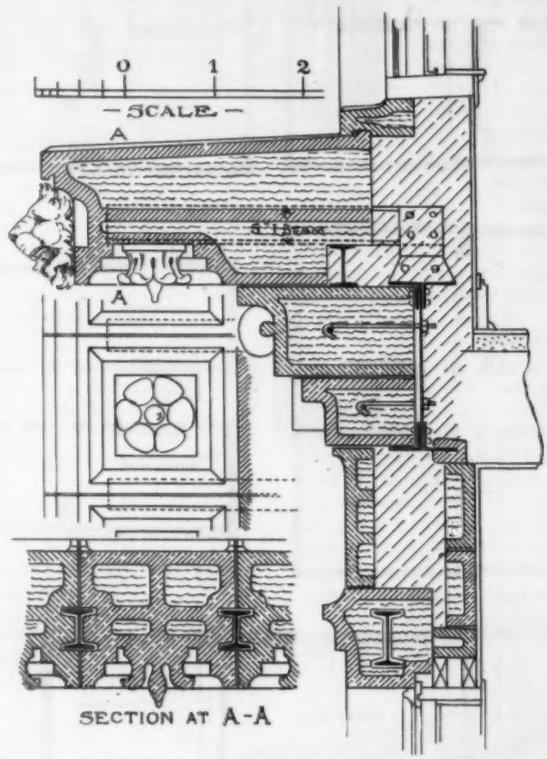


FIG. 42.

His first venture was made in the erection of the Home Life Building, La Salle and Monroe Streets, Chicago, which was begun in 1883, and completed in the following year. In this very building the offices of Messrs. Jenney & Mundy are still situated; and at his desk the venerable pioneer of a successful revolution in the building methods of the world may be found, alert in his movements, quick in his perception, full of interesting reminiscences, and ready to defend the faith that is in him against all comers. We take it for granted that a man such as this will be among the last to deny that as "iron sharpeneth iron, so a man sharpeneth the countenance of his friend."

We would say at the outset that little patience should be wasted on a critic who finds fault with that which *is*, unless he stands prepared to supply the deficiency, and take the risk of showing what he thinks *ought* to have been. This conclusion is reached from a lively appreciation of the fact that: —

> "A man must serve his time to every trade
> Save censure — critics all are ready made."

Acting upon this principle, we take the cornice of the Association Building, La Salle Street, Chicago, and without altering the profile or displacing the girder, rearrange the construction as at Fig. 42. In this way the alteration becomes, to some extent, self-explanatory, and those who wish to follow up the subject will have something tangible to take hold of.

Starting with the architrave, the two courses into which it was divided are now made in one; the blocks being of any desired length up to, say, 2 ft. 6 ins. Should radial joints be required, well and good; they would satisfy the eye of a man who did not pause to reflect, but they would not add strength to work which must be otherwise supported over apertures. Of course the *idea* of strength is worth considering, and there are times when it becomes proper to make needful concessions on purely æsthetic grounds. Of these the present may, perhaps, be considered an instance. In either case provision would be made for a 7 in. I beam, its weight depending upon the width of openings. When the work had been set to line, its soffit resting on a suitable center, the whole of the interstices between iron and terra-cotta should be caulked (from the open chambers at back) full of cement concrete, mixed in the manner recommended by Mr. Jenney. That done, no settlement in the arch or displacement of the blocks could occur. The 12 in. channel and the attached angle can now be omitted and the frieze made as in the original. The dental course and the bed molding above are increased in bond, and made to fit in between the flanges of girder, but otherwise anchored as before, except that the anchors take hold of a ½ in. rod passing *through* the blocks, and are tightened up on a good backing of cement by tension nut.

It is in the cornice itself that the most important change would be made, and that change is radical in principle. The use of hangers is often expedient and sometimes indispensable, but wherever it is possible to introduce a more direct support (as distinguished from suspension) the opportunity to do so should not be allowed to slip. Such an opportunity exists here, and it is our first duty to make minor conditions conform to that fundamental one. The first of these would be to make the block in a single piece, plus the slip-sill; and as it would then be but half the size of blocks that have been made without misadventure, the task in this case would not be a difficult one. The 12 in. I beam used as a fulcrum would give place to a 6 in. retained in the same position and for a similar purpose, with this difference: it would be allowed to rest on the top bed of the course below. The occupation of the longitudinal L's being gone, the cantilevers would be lowered to position shown, and their section changed to 5 in. I's. Finally, if square panels in the soffit were deemed a *sine qua non*, that factor would determine the length of the blocks at about 1 ft. 9 ins.; but if oblong panels were permissible the length of the cornice block might be increased to, say, 2 ft. 9 ins., with advantages that are certainly worth considering. These would consist in a saving of cantilevers, and in reducing the vertical joints to little more than half the number indicated on section (Fig. 42). As to the size of the block so increased, it would still remain less than that of those made (without special difficulty) for the Astoria Hotel, and for other buildings which the

question of space does not permit us to illustrate. Then the protection of these vertical joints; that may be done in a number of ways, some of which were discussed in articles for July and August. Whatever the method, we think, with Mr. Jenney, that the manner should be thorough, and that for the reasons pointedly stated in his remarks. The ways in which cornice blocks and cantilevers may be assembled will be found in the article for September, to which issue, and to those of preceding months, the reader in search of this and similar data is respectfully referred.

At Fig. 43 is shown a cornice of undoubted simplicity, yet giving, when set, an effect that is highly satisfactory, the chenaeu furnishing a particularly bold skyline. It may be seen on the 12th Street elevation of the S. S. White Dental Manufacturing Company's new premises in Philadelphia (Boyd, Boyd & Roberts, architects). The photo, Fig. 44, though taken under certain disadvantages as to the point of view, gives a fairly correct impression of the work as seen from the opposite sidewalk. To obtain adequate projection — in this case 4 ft. 8 ins. plus the lion's head — without adding unnecessary weight to the structure often becomes the turning point between a terra-cotta and a metal cornice. Such was one of the conditions imposed in the design and construction of the subject under notice, and we think the data now presented will show that a fair attempt has been made towards its fulfilment. In Philadelphia the

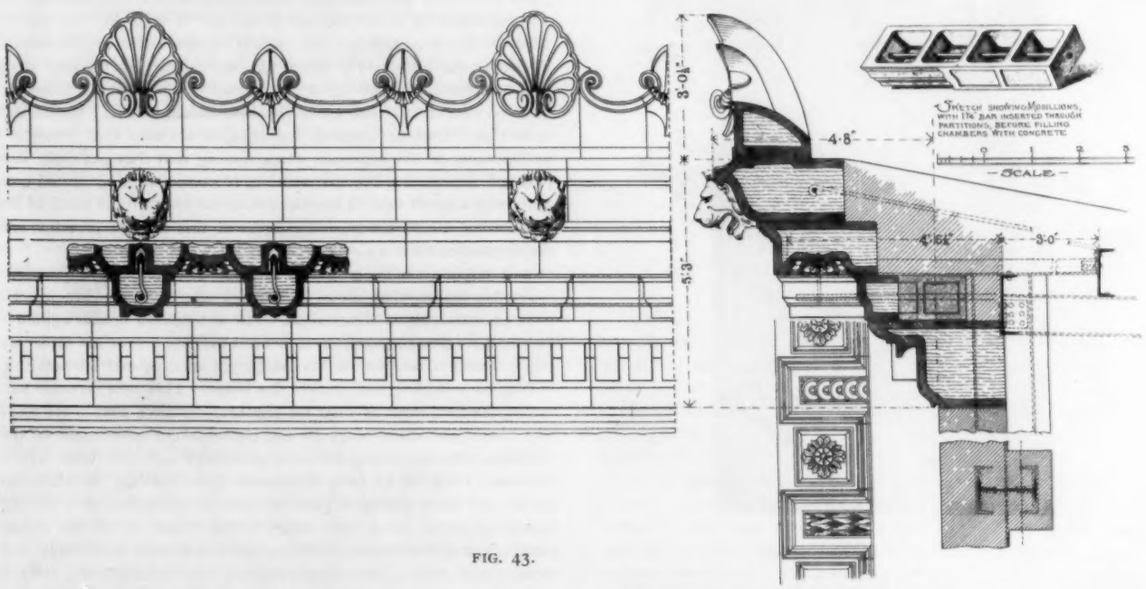


FIG. 43.

building laws are sufficiently abreast of the times to permit of such an attempt being made, without risk of annulment as a foregone conclusion. Had it been in Boston, such a proposal would have been found incapable of execution, by reason of certain belated building laws that have long since outlived their usefulness. Of these, too, we can speak from an unpleasant experience of a few years ago. It is encouraging, however, to know that some concessions have since been made in the manner of their enforcement; but this is not enough: in that respect, at least, they stand in need of a radical revision in the light of progress and advanced practise.

We cannot illustrate the effect of these antiquated ordinances better than by the narration of an incident in connection with a recently erected building in which terra-cotta and brick happened to be the materials used above the first story. The main cornice had a projection of about 3 ft., being supported by steel cantilevers running some distance back into the building and riveted to roof beams. The blocks forming top member of this cornice need not have been more than 2 ft. 6 ins. wide. This would have allowed them a lap of not less than 8 ins. on the bed molding, their weight, in any case, being carried by said cantilevers. But a time-honored law, in which the use of terra-cotta had not been contemplated, enacted long before the steel frame had been thought of, was cited and literally enforced, despite all that could be urged in deprecation of such action. Though originally intended as a precaution in the case of stone, when stone was made to balance on thick walls, and without any iron support, it now received a wider interpretation and was made to apply equally to terra-cotta cornices. This called for blocks with a bearing on the wall equal to their projection, quite regardless of the cantilevers which were spaced on 2 ft. 6 in. centers. The absurdity of all this was pointed out to the powers that be, but to them a city ordinance was like unto "the laws of the Medes and Persians that altereth not." Obstacles of a similar kind were denounced with much fervor some years ago by another distinguished Chicago architect, Mr. Dankman Adler, who, in an able argument published in the *Economist* of that city, inveighed against "official conservatism, self-sufficiency, and self-complacency backed by the letter of the law."

In due time blocks of terra-cotta, one dimension of which was nearly 7 ft. were ordered, but the attempt to make and burn them met with indifferent success. Such of them as had not cracked in the drying and remained intact when taken from the kiln were broken in transit, yet the farce of reassembling and setting the pieces was carried out as per program. Two thirds of that which was ordered to be made in single blocks of terra cotta was, in reality, altogether superfluous. Indeed, we might go the length of saying that it became positively mischievous. For not only does it lie inert and useless; the space it occupies in the wall is but a series of boxes more or less hollow which otherwise would have been built solid in brick and cement; weight in this case being held of high account for its own sake. This, be it observed, resulted from the misapplication of a law which at one time had a specific meaning, but now calls urgently for intelligent revision, with special reference to altered conditions and prevailing methods of procedure. We doubt whether a more glaring anomaly could be found in the building regulations of any city in the Union; if so, it should have the immediate attention of the city dustman.

We are far from saying that in all cases the best possible scheme of cornice construction is adopted. That would imply a degree of cooperation on the part of architect, engineer, and terra-cotta manu-

facturer, the necessity for which is only beginning to be recognized. Neither can we assume that the scheme, after it has been fully elaborated (quite apart from its merits as such), is at all times made the most of in the course of execution. Unfortunately, that is not so; nor could we expect anything so idealistic in the outcome of so brief a period of evolution. It is as yet a new problem, and one for which a solution is being rapidly evolved; but like the language itself, in which we have been said to conceal as well as convey our thoughts, it is not altogether complete. In all the wide domain of human progress there can be no finality. Such improvements as have been made thus far are due to the application of mathematical

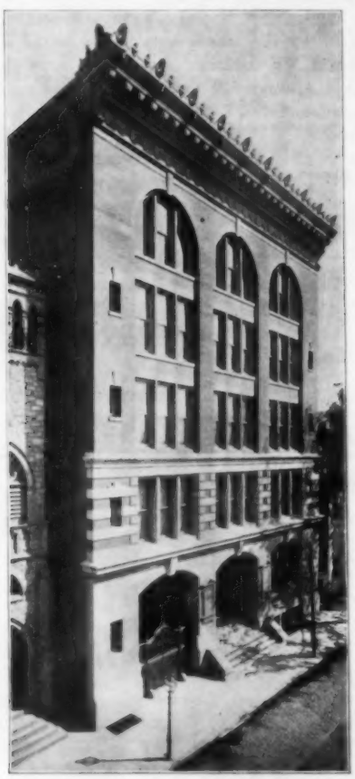


FIG. 44.

principles, of practical skill, and of knowledge such as comes to its possessor by the slow and sure, though not always agreeable, course of experience. Those engaged in it are represented by the architect, the engineer, the clayworker, and finally, the general contractor. Their ultimate aim is, and, indeed, the results already achieved in the construction of terra-cotta cornices are, economy, simplicity, completeness, and absolute security. That much yet remains to be done in these several directions we are free to admit. None the less, however, do we contend that cornices such as have been illustrated and discussed in recent issues of this journal are the logical outcome as they are the crowning triumph of composite construction.

As to the question whether it be desirable or not to introduce brick at all in ecclesiastical edifices, or generally in public buildings, one might, a few years ago, have been anxious to say, somewhat. I trust, however, that the ignorant prejudice which made many good people regard stone as a sort of sacred material, and brick as one fit only for the commonest and meanest purposes, is fast wearing out.—*Street.*

Fire-proofing Department.

THE PRESENT CONDITION OF THE ART OF FIRE-PROOFING.

BY PETER B. WIGHT.

THE question is often asked, "Why should buildings be fire-proofed when it is cheaper, all things considered, to build them otherwise?" This is one of those questions the answer to which is partly within itself and is impliedly in the negative, with many otherwise sensible people. And as long as it is a question of pure economics viewed solely from the investor's point of view, we should not deride and abuse those who view it in that light. When a man's interest is centered in a single piece of property he has no occasion to be public spirited. It is nothing to him whether his building would be a valuable improvement to the town or not. He is only looking for the best percentage on his investment, and takes his chances of fire with the insurance companies. He estimates the cost of his improvement both ways, and reckons his returns both ways. Then he argues with himself how long his building can be kept in good condition, and concludes that it will anyway last through his natural life if it is not burned down, and if it is he can put up another building and get the benefit of the latest improvements. Therefore he estimates to insure his rents also. But the only thing that troubles him is the 80 per cent. clause in his policies. However, he must take some chances, and this is an indefinite one. In addition to this he introduces some of the cheapest features that produce a modification of his insurance rates, finding that they pay from that point of view, and when his building is completed and rented congratulates himself that he has been more successful than some of his neighbors. There are many examples of this kind of investor, and the circumstances are always in his favor.

It might have been said as one answer to the above question: "Because the building law of the locality says it must be fire-proofed if it exceeds certain dimensions." In this answer is also hidden a deeper fact: that the investor, if he finds that the size of his projected improvement comes within this category, must fire-proof his building, willing or unwilling, and mostly the latter. This new investor surveying the field looks at what his predecessors have done. He finds that there are many ways to comply with the provisions of the building laws concerning fire-proof buildings, and still keep within the law. Perhaps he finds that some great building in which no pains have been spared to get the best results is not on a paying basis, and some other one, which is the result of all the cheap materials and devices obtainable, glossed over with much onyx and mosaic, and replete with every comfort and convenience, is in a flourishing condition. All he wants now is an expert able to get around all the expensive materials with cheaper ones that can be made to pass the inspection of the building department, and he is ready to go on with his building. But knowing that he has sought to evade the spirit of the law, he protects himself with insurance, and gets that also as cheap as he can.

Another and somewhat discouraging element that enters into the discussion of the fire-proof building question is of an architectural nature. How many men have asked themselves the question: "Why should I build for all coming time when my neighbor finds it more profitable to build only for a lifetime? I see around me many substantial structures that I admired in my youth, now degenerate and given over to baser purposes than those for which they were erected, and some being torn down to be replaced by monster bird cages. What will my projected bird cage look like forty years hence to the eyes of my children and grandchildren?" He muses on the fleeting fancies and fashions of the present day, which are overriding and displacing many of the best structures of a quarter of a century ago, and wonders why this will not go on forever. He wonders if inven-

tion and improvement will ever cease in our land, and says, "No! The Watchword of Americans is Excelsior!" and then adopts the plan of the most plausible of the many "enterprising" architects who are always thrusting the "latest thing" under his nose. Fashion has conquered his judgment.

This is no fanciful picture. During the last three years a period of financial stagnation prevailing in many of the largest cities of the continent has given those whose energies are usually exerted in projecting public and private improvements, especially in the line of building, much opportunity to mentally speculate on questions which largely concern the architects of the country, and the manufacturers and builders who carry out their plans. They are now criticizing what has been done in years of excitement and occupation which prevented serious thought. They are weighing the results of recent investments in the larger class of buildings, and find many wanting. It is being discovered, or at least asserted, that there has been extravagance. Already some new buildings are projected in which it is sought to depreciate rather than appreciate the quality of materials heretofore used. This is now the general tendency, to which, of course, there are exceptions.

It may be seen in the disposition to cheapen the methods heretofore used in making the interiors of buildings fire-proof. Instead of our past experience resulting in the improvement of old methods, entirely new ones, seeking to supersede the old, seem to find a ready acceptance; and whatever their merits or demerits, they are certainly cheaper methods, and are advocated and accepted largely on that account. The danger of accepting cheaper methods is in the fact that they are generally taken without question as to their quality. They are also taken without being tested by *actual experience*. The only experience to recommend them is found in experimental tests and demonstrations.

The present year has witnessed the only experiences of burned clay when used for fire-proofing purposes on a large scale, and under circumstances calculated to be most disadvantageous to them, that the world has ever seen. Though not unscathed they have done their work, they have fulfilled their purpose. When the crucifiers cried out to the Man of Nazareth, "He has saved others, now let him save himself," they confessed to believe that which they sought to make others think they did not believe. And so the scoffers who can only say that clay fire-proofing has not in a crucial test saved itself are obliged to admit that it has saved the structure of more than one building. It is also a fact that every other pretended system of fire-proofing heretofore used has been an absolute failure when subjected to the ordeal of fire in a large building. Such are the so-called fire-proof buildings erected twenty years ago. Of incipient fires and those that have burned out entire stories without destroying the building the records of clay fire-proofing are a multitude. Many of these have been collected and published in THE BRICKBUILDER, and others remain to be told (see BRICKBUILDER, November and December, 1896). Of buildings with unprotected windows fire-proofed with burned clay, which have resisted the onslaught of fire from adjacent structures that were totally destroyed, may be mentioned the Montauk Block and Schiller Building at Chicago, the latter being of steel skeleton construction, with exterior side walls of hollow tiles.

The experiences of the present year are full of instruction to those concerned in burned clay fire-proofing, and the good result of this will doubtless be seen in the near future. The makers and users have within recent years been too confident in their previous successes, and have neglected to make improvements which are always possible to those who are seeking to make them. There are no defects in the methods of manufacturing and using burned clay that cannot be easily overcome. It is in the selection of the raw materials that there is the greatest field for improvement. After this the most important matter is the method of construction, and the relative quantities to be used for specific purposes.

As far as hollow tiles are concerned, if we have in view the usual systems of many makers which present continuous ceiling surfaces, it is claimed that the chipping off of the bottoms is total destruction of the material from the insurance point of view, even though it has stopped the fire and saved the steel beams. The hollow-tile system thus far used for floor construction is a single system with a double purpose. The systems depending on light metallic supports for concrete or plaster are nearly all double; the floor construction is independent of the ceiling, and the ceiling is stretched below to protect the floor construction. Sometimes it protects the bottoms of the beams, and sometimes they are independently protected. But in all cases it is there to be washed away by water after it has done its work, at which time protection to the floor construction is no longer needed. If the clay system was used on the same principle the results might be different. Up to about seven years ago very many buildings had been constructed with ceilings of fire-clay tiles. In most cases these tiles were attached to wooden floor joists. In many of the fire-proof buildings of Pittsburgh and farther West these tile ceilings were used with steel construction for the highest story. There is only one example east of Pittsburgh, in the American Bank Note Engraving Company's building at New York. In the well-known Horne Department Store, and also in the Horne Office Building at Pittsburg, the highest story was ceiled with clay

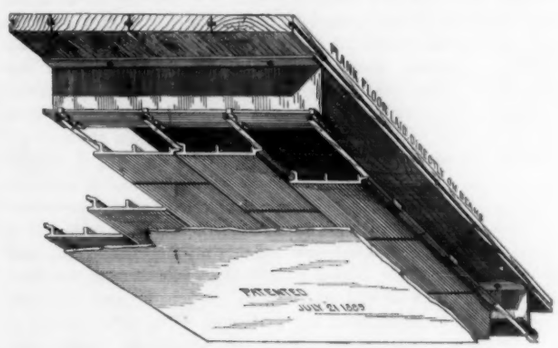


FIG. 1.

tiles, and in each case they were in no way affected by fire from beneath, or by water to which they were also subjected in the Horne Office Building. Another kind of clay tile ceiling was used in one of Ryerson's buildings on Randolph Street, Chicago, where a severe fire raged in the second story two years ago. This has also been described in THE BRICKBUILDER (December, 1896).

In all these cases the tiles were either made in one thickness of material or were hollow tiles that had been split in two after being burned in the kilns. In each the tiles endured the most intense heat and the application of water without falling or cracking. Several methods have been used for making and putting up such tile ceilings with more or less efficiency, but unfortunately they have been driven out of use by cheaper processes. But it has been demonstrated that ceilings of fire-clay tile, and only of tile, will endure tests that no other material will stand, even hollow tile itself. The reason is plain. A hollow tile when it cools in the kiln may still be under a strain in some of its parts, due to shrinkage. This is relieved by splitting it, it having been previously scored for the purpose. These tiles in a ceiling are in a state of rest. Each is independently fastened, and each is free to expand, contract, or move a slight distance. The thinner they are, if of hard tile, the more readily they will respond favorably to the attacks of intense heat or cold water. Everything depends on the way they are fastened; but the difficulties in this respect have been overcome by blind fastenings and overlapping joints. The illustration (Fig. 1) shows a section of one of these ceilings attached to I beams. The brick or tile arches are not shown. Suppose that each I beam was covered on the bottom with heavy porous terra-cotta skew-backs continued under it and a segment tile arch thrown across from skew-back to skew-back. We would have the lightest, most reliable and economical floor construc-

tion with hollow tiles. Now, if hangers are inserted through the crown of the arch, a ⊥ iron can be attached to them running parallel with and between the beams, to which the small angle irons can be attached by iron cleats, as shown in the cut. Thus the tile ceiling would be independent of the beams, giving them increased protection in addition to the skew-backs, and furnishing a non-cracking protection to the whole floor construction. Care should be taken to allow for longitudinal expansion in all the ⊥'s and L's.

Such a construction would be the same in principle, as has been said, as those proposed to be cheaply executed with metallic furring, concrete, and plaster; but carried out in a material absolutely indestructible by fire and water, requiring only a new plaster surface to restore it to its original condition. It is not to be expected that it would suit the man who seeks to get around the provisions of the building laws, but it would be demanded for the highest class of buildings wherever the best of everything is sought for.

NAKED STEEL CONSTRUCTION SEVERELY TESTED.

A FIRE of extraordinary severity and destructiveness occurred in Detroit on the 7th of October. It destroyed the Detroit Opera House and five adjacent buildings of ordinary construction, two of them fronting on Gratiot Street in the rear of that on which the opera house fronted. In addition to these last was another building adjoining them and situated only 20 ft. from the rear wall of the opera house, occupied by the H. R. Leonard Furniture Company, and designed by Rogers & McFarlane, architects, of Detroit. This building was 26 by 110 ft., and ten stories high. Besides the street front on Gratiot Street, its side, 110 ft., fronted on a 20 ft. alley, and an alley 20 ft. wide separated it from the opera house. The whole building was of riveted steel construction and had girders and columns through the center. The front was of brick, but the side and rear were covered on the outside only with hollow building tiles. Curiously, while the whole skeleton was steel, all the floors were of mill construction. It was in open lofts and stocked with furniture from top to bottom. The only attempt at fire-proofing was to cover the columns and girders with fire-clay tiles. Everything combustible in it was completely burned out, and it must have made a most intense fire. But the entire steel skeleton remains standing, with the front wall and about half of the tile wall on the alley. The columns and girders are of course standing with the frame. The covering of the columns and girders, which were certainly more exposed than any other part of the frame, may have been the means of preventing a total collapse. The amount of damage to the steel work has not yet been ascertained. The only wonder is that the burning of the combustible floors did not bring down the whole structure. There is nothing remarkable in the falling of a large part of the hollow-tile covering on the exterior, for the unprotected steel must have been greatly expanded and warped by the intense heat on the inside. There were no fire shutters on the rear. This experience only speaks well for riveted steel structures, but the whole may have to be taken down if it is warped out of shape as a whole, or in any of its details.

FIRE-PROOF BUILDINGS.

SINCE the decline within the last few years in the price of iron and steel, accompanied, as it has been, by the breaking up of what was once known as the steel beam trust, the number of fire-proof buildings that have been erected in the large cities of this country has greatly increased. The adoption of the so-called skeleton form of construction is a method which permits of the utilization of space to an extent which would have been found impossible if the old methods of building had been continued. As it is now, it is estimated that a fire-proof building can be put up at about half the price that would have been required to pay for the construction of such a building eighteen or twenty years ago, while, as compared with the ordinary non-fire-proof building, one of these modern fire-proof structures is said to call for an outlay not greater than 10 or 15 per cent. more in amount. This slight margin of increase is more than made good by the increased space obtained, as referred to above, and also by the fact that when once put up a building of this kind requires but a small expenditure in the way of repairs, and possesses the merits of indefinite durability. But beyond this there is also the fact that the insurance rates charged against fire are so much lower in the case of fire-proof structures than those which are not built in that manner, that the saving forms a considerable return in interest upon the extra money spent in the work of construction.

But while a building may be classed as fire-proof — and this classification, unfortunately, has been given to a great many structures which do not deserve to be put in such a category — no form of building can offer absolute immunity against the destruction by fire of the inflammable contents which may be stored within it. Our building laws have put no limit upon the area which may be covered by a so-called first-class or fire-proof building, and it is obvious that if such a structure extends over half an acre or an acre of ground, and has each of its floors filled with combustible merchandise, a fire taking place and obtaining great headway on one of these stories may in itself cause a large loss, even though the building itself may not suffer material damage. This was the experience in the conflagration which took place in Pittsburg about a year ago. The fire started in a building of ordinary construction, but the flames were carried by the current of air against the unprotected glass windows of a fire-proof building on the opposite side of the street. The result was that the merchandise on each story of the latter building was set on fire and completely burned up. The structure was in certain ways faulty, a fact which was brought out by the hard test of a hot fire. But the main structure of the building stood firm, although its entire contents were converted into ashes.

A few weeks ago an alleged fire-proof building, a storage warehouse, took fire in Detroit, and in this case the contents were entirely destroyed, while the building itself was damaged to an extent which may require almost entire reconstruction. In this instance, the fire-proof qualities possessed were those of name rather than of fact.

But in view of the presumable loss which might happen to the contents of our fire-proof buildings, when these are used for the storage or sale of inflammable material, it is not unlikely that some restriction should be placed upon the extent of undivided areas. With a building of second-class or ordinary construction the limit of area is 8,000 ft., a space which, if filled with inflammable merchandise, is quite large enough, when on fire, to furnish hard work for a fire department in its efforts to extinguish the flames. In view of the fact that the tendency of the times is in the direction of fire-proof construction in this city, and in view, furthermore, of the circumstance that it is well to take precautions against a known danger in advance, it would be prudent to put some limit in the way of dividing fire walls in fire-proof buildings which will be erected in the future.

So far as office buildings are concerned, no limitation is required, for the reason that these are of necessity divided by fire-proof partitions into relatively small compartments, while the contents of these is hardly ever of a character to offer the materials for a hot fire. The same statement holds true of apartment houses and hotels, which are also cut up by interior fire-proof partitions, so as to impose a check to the quick spread of the flames. But in the modern warehouse it is often thought desirable to have a large undivided area, and these areas are commonly filled with considerable quantities of inflammable merchandise. If the regulations of our building laws were such that these floor areas could not extend over a greater space than 10,000 sq. ft., and where a store of three or four times this area was required, it would need to be divided from the ground upward by solid fire-proof partitions, cutting up the building into sections of not exceeding 10,000 sq. ft. each, it is probable that the convenience of trade would not be greatly interfered with, while the construction would be such as to make it possible for the fire department to hold a fire that occurred within the limits of the floor of a single section, thus making a conflagration impossible.— *Boston Herald.*

Mortar and Concrete.

LIME, HYDRAULIC CEMENT, MORTAR, AND CONCRETE. VIII.

BY CLIFFORD RICHARDSON.

THE ROSENDALE CEMENT INDUSTRY.

PHYSICAL TESTS OF NATURAL CEMENTS.

THE strength, when determined under similar conditions in the laboratory, is a valuable indication of the character of a cement and of the effect upon it of variations in its chemical composition and physical properties. Each kind of cement is made into test pieces in the way most favorable for developing its best qualities, the fineness of grinding, the amount of water necessary to make the mortar, and the time required for setting being observed. At intervals the strength, either tensile or compressive, is determined.

Examinations of this kind have been made by the writer in the last few years of most of the well-known brands of natural cement in use in the concrete base of asphalt pavements over a large portion of the United States. The results are given in the following table,

	Fort Scott, Kans.	Double Star, Kans.	Mankato, Minn.	Utica, Ill.
Neat: —				
7 days	769	1072	1663	1538
28 days	1256	2402	2288	1972
3 months		3155		
Two parts quartz: —				
7 days	417	988	575	1075
28 days	680	1470	834	1450
3 months		2718		

	Average Rosendale.
Neat: —	
28 days	1737
Two parts quartz.	
28 days	614

An examination of the data in the table shows that there are very decided differences to be noted in connection with the fineness of grinding of the samples of the different brands, the amount of water necessary to make the strongest mortar, the set and the tensile and compressive strength at different ages. It would also be found, among a large number of tests of the same cement, that there are often considerable variations in many of the brands themselves from time to time and from year to year, depending on changes in the character of the rock and in the manner of burning. For comparative purposes, however, the results which have been selected are sufficiently illustrative to show what the general differences are in the nature of our natural cements when at their best.

PHYSICAL TESTS OF AMERICAN NATURAL CEMENTS, TENSILE STRENGTH, FINENESS, ETC.

BRAND.	Fineness.			Water in Mortar.		Set.		Neat, tensile strength, pounds per square inch.						Two parts crushed quartz.				
	200	100	50	Neat.	Sand.	Initial.	Hard.	1 day.	7 days.	28 days.	3 mos.	6 mos.	1 year.	7 days.	28 days.	3 mos.	6 mos.	1 year.
Rosendale, best, N. Y.	10.	7.	2.	28.	12.	20′	35′	100	206	400	450	457	500	80	150	250	370	450
Rosendale, average, N. Y.	24.	12.	3.	28.	14.	20′	35′	75	150	300	325	375	400	45	130	210	270	340
Buffalo, N. Y.	32.	24.	6.	26.	12.	18′		80	240	310	(305)	(290)	(346)	80	152	(115)	(103)	(97)
Akron, "Star," N. Y.	12.	7.	2.	26.	12.	8′		112	300	320	(317)	(364)	(369)	108	230	(152)	(140)	(115)
Milwaukee, Wis.	18.	10.	2.	30.	13.	45′	80′	120	160	334	338	(327)	(372)	60	80	(135)	(152)	(156)
Utica, Ill.	24.5	15.	4.	32.	14.	15′	35′	190	249	336	(257)	(242)	(259)	118	140	200	(122)	(134)
Louisville, "Anchor," Ky.		24.	11.	31.5	13.5	22′		110	222	310	(327)	(368)	(416)	98	152	(110)	(144)	(161)
Louisville, "Speed," Ky.	24.	16.	10.	33.5	15.	5′	10′	180	248	394				72	164			
Sellersburg, Ind.		27.	12.	30.	13.5	27′		40	60	320				30	130			
Fort Scott, Kans.	12.	4.	trace.	37.	14.	10′	22′	52	100	160				36	86			
Double Star, Kans.	9.	3.	1.	38.	15.	8′	36′	116	210	305	276			114	256	398		
Mankato, Minn.	31.	9.	1.	30.	14.	45′	65′	188	238	346	(259)	(280)	(319)	112	160	(120)	(126)	153
Union, Penn.		7.		28.	12.	33′		170	230	375				150	250			312
Improved Union, Penn.	30.	15.	3.	28.		16′	43′	140	219	314	324	397		145	231	296	359	400
Round Top, Md.		15.	8.	32.	14.	30′	50′	100	230	300	410	446	526	122	255	342	387	515
Cumberland, Md.		19.		32.	14.	30′		100	300	375	371	393		156	207	356	350	438
Cumberland and Potomac, Md.	30.	17.	4.	32.	14.	32′	63′	100	300	315	371	393		188	225	403	397	436
Antietam, Md.		7.		32.	15.	30′		65	146	300				70	124	162	226	232
Shepherdstown, Md.		14.		30.	14.	20′		70	160	300				106	210	265	281	366
Anchor, Penn.		10.	1.5	25.	13.5	75′		150	300					90				
Milroy, Penn.		19.5		30.	13.	20′		50	170	400				70	200			
Utah		13.6	3.5	32.	14.	8′	41′	80	204	280	390			52	230	336		

An examination of the data in the table shows that there are very decided differences to be noted in connection with the fineness of grinding of the samples of the different brands, the amount of water necessary to make the strongest mortar, the set and the tensile and compressive strength at different ages. It would also be found, among a large number of tests of the same cement, that there are often considerable variations in many of the brands themselves from time to time and from year to year, depending on changes in the character of the rock and in the manner of burning. For comparative purposes, however, the results which have been selected are sufficiently illustrative to show what the general differences are in the nature of our natural cements when at their best.

These differences must be considered in the light of our previous information as to the chemical composition and density of the several cements and of our actual experience with them in their practical applications.

Fineness. How fine a cement may be when put on the market is primarily purely a question of the care bestowed on grinding, but under ordinary circumstances it is dependent, to a large degree, on the hardness of the burned stone. The facilities for grinding are much the same at all cement mills, and at but few of them, at least hitherto, has sifting and care in grinding been practised. In the manufacture of the best Hoffman Rosendale of New York scalping or sifting, as well as grinding, is carried on, with the result that this cement is extremely fine, and yet there are some other cements which are softer and as satisfactorily ground without scalping.

The importance of fine grinding appears from comparative tests of sand mortars made of cement from which the coarser particles have been removed, and of that containing a considerable portion of coarse material, which, by itself, has little or no hydraulic activity. These tests show that, other things being equal, the finer the cement the stronger are the sand mortars made with it, at least

supplemented, where some of the long-time tests are incomplete, by those of other investigators which seem comparable. It is impossible, however, to use the tests of the manufacturers themselves, and of many city engineers as a means of comparison, owing to the methods employed, which are quite different from those in which the test pieces are made with dry mortar and of sufficient density. It has been possible, however, to use some of the results of the excellent tests made in the office of the Inspector of Asphalt and Cements of the District of Columbia, and some of those of the cement testing department of the Board of Public Works of Philadelphia, which are the only ones available which are made under the same conditions as those of the writer, upon which the table is based. The results of some long-time tests of Western cements carried on under the direction of the city engineer of Minneapolis, from 1888 to 1894, are also introduced in parentheses, although only comparable among themselves.

TESTS OF COMPRESSIVE STRENGTH.

Pounds per square inch.

Brand	Buffalo, N. Y.	Akron, "Star," N. Y.	Louisville, Ky.	Milwaukee, Wis.
Neat: —				
7 days	997	1325	1737	913
28 days	1300	2812	2795	1457
Two parts quartz: —				
7 days	700	700	500	506
28 days	980	1300	1065	822

in the ordinary proportions and at early stages, although in the neat form, the mortar, made with coarse cement, may produce a test piece stronger than that made with the finer material. On this account as our best natural cements are now furnished of such a degree of fineness that less than 10 per cent. is coarser than will pass a 100 mesh sieve, it is important that the coarser cements should not be accepted for use, at least at the same price as the finer.

Fineness is undoubtedly an element of importance, although probably not as much so as in the case of Portland cement, which is used with larger proportions of sand. Fortunately the manufacturers are beginning to appreciate the fact that the improvement that they make in their cements by attention to this detail repays them by the higher test which the finely ground material will give, and the readier sales it will command where they are made to persons who understand the importance of fine grinding and who test their cements carefully before using. Upon those who pay little or no attention to the character of the cement which they employ such a refinement may, no doubt, be thrown away.

Set. Natural cements, when made into mortar with the smallest amount of water, set in from a few minutes to an hour or more. There is a wide difference in this respect, although, as a rule, natural cements are quick setting. The variations are due to the composition of the rock, the extent of its calcination, and the degree to which hydration of the finished cement has been carried. Much high-grade cement may, when first burned and ground, heat when mixed with water and set too rapidly, but when properly hydrated by sprinkling or steaming the burned stone or by storage, it may be made to set slowly and give satisfactory results. The lime cements are usually the quickest in setting unless hydrated, but they are equaled in this respect by many magnesian cements, too rich in carbonates. Very slow setting is unusual when cements are freshly burned. When found it is due to weathering, air slaking, and age, or to deficiency in the proper proportions of lime to silicates.

Normal natural cements, satisfactory for use, when mixed with a small quantity of water, it appears, begin to set in from fifteen to thirty minutes, and are hard set, that is to say, not easily indented by the nail, in about forty-five.

The time required by the same cement, when employed under varying conditions, may vary very much. The more water there is used in making a mortar the slower the set will be. The warmer the water and air the quicker the set; and the more humid the surroundings, and the more excluded the mortar is from the air, the slower it will set.

On this account quick-setting cements must be mixed with more water than slow. They are also frequently in demand where the surroundings have a tendency to delay setting.

Water. The amount of water necessary to make the strongest mortar with each cement for comparative tests is variable. It is commonly expressed in percentages by weight. This is, however, to a certain extent deceptive, as the relation is one of volume.

The variation in the amount of water required is due to several causes,— the degree of fineness to which the cement is ground, the specific gravity of its particles, its volume weight or density, and to its chemical composition. With considerable coarse material the voids in the cement are smaller and the volume of water required for a mortar less. When one cement has a higher specific gravity than another the same volume percentage of water will mean a smaller welght per cent. in the first case. For instance, 300 parts by weight of a cement having a specific gravity 3.00 might require 84 parts by weight of water to make a mortar, while 265 parts by weight of a cement, having a specific gravity of 2.65; but an equal volume with that of 300 parts of a specific gravity of 3.00, would require the same volume of water, or the same amount by weight, 84 grams, but in the first case the per cent. of water by weight would be 28, and in the second, with the light cement, 31.7, although in each case the volume was the same.

The chemical composition of a cement has probably the greatest influence upon the amount of water necessary to make a mortar. Depending upon the quantity of water necessary to hydrate and combine with certain compounds the amount necessary in addition to make the mortar plastic will vary. The cement made at Fort Scott, Kans., requires much more water than any other natural cement to properly temper it. This is due to the fact that on its addition a portion of the water is at once taken up in chemical combination by the cement, leaving only an ordinary amount to act in the physical operation of making a mortar. The magnesian cement of Western New York requires but 26 per cent. of water and the best Rosendales but 28. Here there is not the same immediate demand for water to combine with the cement chemically, and so a smaller volume is sufficient to make a mortar. The quicker setting a natural cement is the more water it requires, as a rule, as the quick set is merely an evidence of active chemical change which requires and ties up additional water.

The difference in the volume of water required by a natural and a Portland cement also illustrates the effect of difference in composition in the amount of water requisite for making a mortar. A good Portland cement of specific gravity 3.15 requires 21 per cent. by weight of water to make a mortar. 315 parts by weight would, therefore, require 66.15 parts by weight of water. The relation of the volume of the particles of cement to that of the water would be as 100 : 66.15. A Rosendale cement of specific gravity 3.00 requires 28 per cent. by weight of water or 84 per cent. by volume of the particles of cement. The Rosendale, therefore, requires over 17 volumes more of water to the 100 of solid cement on account of its different chemical composition and aside from the difference in density.

Another difference in the behavior of cements towards water is the variable amount of working mortar that different kinds of cement require, owing to differences in the speed with which water acts upon them. Some quickly make a smooth and plastic mass, while others require a more prolonged kneading to bring about the proper hydration of certain constituents.

In the practical use of natural cements these peculiarities have their influence and will be noted later.

Strength, Tensile and Compressive. The results of tensile tests of cements given in the preceding table are of representative samples of the best grade of each brand as far as they have come to our attention and for the strongest test pieces which care and experience can make under the most favorable condition. Under these circumstances the tensile strength appears to be, in almost all cases, satisfactory, and it seems that many of the brands attain a strength of over 100 lbs. per square inch in the form of sand mortar, 2 to 1, at the age of seven days, and may be expected to reach this standard at all times. Some brands do not reach this strength at seven days but gain it later, while a few do not continue after some time to increase in strength in the proper ratio. These peculiarities may profitably be examined by comparing the results of the tests with the chemical composition, and what we know of each brand in practical work and other properties of the cements.

Typical Natural Cements. As types of high-grade natural cements of the magnesian and lime classes the Hoffman Rosendale and Round Top cements may be selected. After learning to what their valuable properties are to be attributed it is then of interest to compare the other cements of the country with them, and to learn to what the differences in the latter are due.

Rosendale Cement. Using this term as applied properly to the product of Ulster County, N. Y., alone, we have seen that this cement, of which Hoffman Rosendale has been taken as one of the highest grade brands, is made from a dense rock, that it has a high specific gravity and is finely ground. In tensile strength it does not equal some other cements soon after it has been made up, but with age it increases in strength slowly and continuously without expansion, and is not to be excelled by any of the cements of its class when a year or more old. An examination of its chemical composition shows that its excellent quality must be attributed to the fact that it contains about 15 per cent. of alumina and iron oxides repre-

senting an abundant supply of the necessary clay, that the combined silica reaches a satisfactory figure, and that the magnesia is not excessive for a magnesian cement, being about 14 per cent. It appears that the rock is lightly burned, as shown by the uncombined silica and silicates, the cement is very finely ground and, both in the testing laboratory and in construction work, has proved itself for years such a satisfactory article that it may be fairly used as a standard with which to compare other cements. The color of this cement is a deep and dark brown, decreasing in intensity with the decrease in the amount of silicates in the rock from which it is made.

Round Top Cement. Although this cement is known only in the limited markets, reached from the place where it is manufactured in Maryland, it is such a perfect type of a natural cement, nearly free from magnesia, that it has been selected as the standard of its kind. An examination of its physical and chemical properties and a comparison of them with those of the best magnesian brands is instructive and shows to what its valuable properties are due.

It is of only ordinary fineness but of considerable density. It sets in about the same time as many Rosendale cements, but it sets harder and gives much more rapid returns in strength both neat and with sand soon after being made up, both in test pieces and on the work. It is not exceeded in strength by any natural cements after the lapse of considerable periods of time, though equaled, of course, frequently by some other brands of its kind. It is not as plastic as Rosendale cement and requires more water to make a dry mortar and more working to make a smooth one. It does not lose as much in initial strength on addition of excess of water nor is it affected as much by cold, and can be used in winter weather where a magnesian cement would fail. It is particularly suited for concrete work, where centers are to be drawn, owing to its great initial strength and rapid gain. The valuable properties of this cement must be due, as in the case of the best Rosendale cement, to the satisfactory proportions of its various components. The combined silica, in an average sample, reached 21.68 per cent. and the alumina and iron oxide 12.48 per cent., corresponding to very similar proportions in the Hoffman Rosendale, but the magnesia fell to but 2.86 per cent. The absence of the magnesia gives a very different character to the cement, its property of acquiring great initial strength, and one which distinguishes it sharply in its working from most magnesian material.

As taken from the kiln the ground rock or fresh cement is apt to be hot and quick setting, but on sprinkling the burned material with a small amount of water before grinding this difficulty is removed.

In color this cement is a medium between the dark Rosendales and the light Western cements, which may be described as a light brown shading into buff.

SAND CEMENT.

THE engineering public is always interested in the improvement of cement. One of the most likely directions for such improvement at present seems to be the use of sand cement. Concrete is a mass of coarse stone or gravel whose interstices are filled with sand, which in turn has its interstices filled with cement. The finer we grind the cement the more completely is the surface of each sand grain covered with it, and the stronger the resulting mass. Now let us go one step further and we have sand cement. Let us take a mixture of, say, one to one of Portland cement and pure sand (silica sand), and regrind this mixture into an impalpable powder, in which the cement gets ground very fine and the sand itself is as fine as ordinary cement. If we mix this sand cement in the proportion of, say, one sand cement to three ordinary sand, we obtain a mortar nearly as strong, and, indeed, some claim, fully as strong, as an ordinary mixture of one cement, three sand. — *Prof. Cecil B. Smith, in Canadian Engineer.*

The Masons' Department.

THE WAY TO AWARD SOME BUILDING CONTRACTS.

MOST buildings at the present day are planned and constructed on what might be called a mercantile basis, the dominant idea being to obtain the greatest possible results with the least possible expenditure of money; in fact, in a large proportion, if not a majority of cases, it is necessary to cut down the figures which have been obtained in competition, in order to make the two ends meet. But while such is the ordinary and every-day experience, there is, fortunately, a growing demand for well and thoroughly built buildings, particularly in the cases of the best domestic work, where the owner is willing to pay a fair price for what he receives. In such instances, if the architect desires to take advantage of his opportunity, he must certainly adopt a different policy in obtaining estimates and awarding the contract from the method usually pursued.

The unfortunate and inevitable consequences of close competition in awarding building contracts have been already pointed out in these columns, and it naturally follows, if work can be given out on some other basis, the results, all other things being equal, will prove of material benefit to the owner and will place the architect in the best possible position to obtain the most satisfactory results in all directions.

There may be said to be three ways in which work can be figured besides the usual way of obtaining competitive estimates from several parties. First, to have the work done by the day; second, to have the work figured by some one person without letting him know that it is being done without competition; and third, to call in the contractor,— who, all things considered, seems to be the best qualified to execute the work at hand,— and tell him frankly if he can give a satisfactory figure he can have the contract. Whatever advantages the first method may have, there is one serious objection to it for which there is no apparent remedy, and which consequently renders it impracticable except in rare instances; the fatal objection to day work lies in the fact that the journeymen employed on the job always learn in some unaccountable way of the manner in which the job has been let, and work with the idea that it is for their employer's interest as well as their own to make the work last as long as possible. Such inertia it is practically impossible to overcome; and this condition alone, and without various contributing causes, is sufficient reason why day work infallibly overruns the most liberal preliminary estimates. And this is a sufficient reason for not adopting this method except, as has been said, under peculiar or unusual conditions.

The second and third methods are practically the same, except in the first case the true facts are only partially known to the contractor, but it is doubtful if the results justify the mild deception which is practised when the architects pretend that the work is to be figured in competition; in fact, it is quite questionable whether the average builder can be kept in blissful ignorance of the true state of affairs, and if he learns or even surmises the true facts of the case he is much more liable to recognize and improve his chance for liberal profit than if the true conditions were presented for his consideration. It is an indisputable fact that the average man meets the opportunity which has been given him outright much more fairly, squarely, and liberally than he does the one which he has won in rivalry. The spoils of war, even in such mild encounters as the competition for building contracts, seem to carry certain rights, which are unfortunately and unjustly looked upon as inherent, which cannot be easily changed, and which work to the ultimate disadvantage of both the owner and the architect. It is sufficient, in support of this fact, to call attention to the practise of figuring work at cost and depending upon extras and other similar tricks of the trade to acquire a profit, and it can be seen that if a reputable contractor is given the opportunity to include his profit in the original proposition he is in honor bound to do additional work at fair prices.

As plans and specifications near completion, and the architect has mastered the details of the problem, he naturally considers to whom he would award the contract if left free to do so, and instinctively, as a rule, he makes up his mind that, all things considered, there is some one individual or firm who are better fitted to do this given piece of work than any other. Let the architect lay these facts clearly before the owner, and if he is clear sighted enough to realize his opportunity, he will allow the work to be given out without the usual competition, which so often handicaps all concerned at the very start. Another advantage, and by no means an unimportant one, in awarding work in this manner lies in the fact that it is much easier, when proceeding under this plan, to regulate and control the sub-contractors, the importance of which is readily recognized by any one who has had experience in building.

The great objection which is urged against this plan of awarding contracts without competition is the prevalent idea that no client would listen to such a proposition; in fact, we are often given to understand that it would weaken the position of the architect to suggest such a radical proposition. But if the proposed building has been worked out in such a way that sharp competition is not necessary to bring the figures within the limits, it is reasonable to suppose that an intelligent owner can be made to see what will result in a substantial benefit to himself. This method of procedure is at least worth a fair trial in all cases where it promises to bring about improved relations and a better standard of work. And every case which is successfully carried out creates a precedent which makes it easier to accomplish the desired ends in the future.

THE manner in which the huge gasometers on the site of the new South Union Station, Boston, were demolished was certainly novel and interesting. These were built of brick, with very heavy walls so strongly knit that the roof of one of the buildings was blown off with dynamite without weakening the walls in the least, although before the dynamite was used the iron bolts and braces had been removed. In taking down the brickwork an application was made on a gigantic scale of a principle often used in cutting butter and cheese. At intervals of about twenty-five feet about the gasometer were narrow windows extending the greater portion of the height of the wall. A strong wire cable was made fast to the ground at the base of the inside of the wall, carried over the top and down to the ground on the outside on the line of a window, and taken through a pulley block to the drum of a hoisting engine. When all was ready the engine was started, the wire wound up on the drum, and the great strain forced the cable to cut vertically through the bricks and mortar almost as smoothly as it might have passed through an immense cheese. After the brick wall had thus been cut vertically a table was passed around a pier between two windows, the hoisting cable attached to this cable on the inside and thence carried over the top of the wall and directly to the hoisting machine. When the power was gradually applied the immense slice of wall began to reel and totter and finally fall with a crash on the outside of the enclosure. This is about as expeditious a way of removing a large mass of masonry as we have ever heard of, and accomplished the desired result with great satisfaction.

A NUMBER of years ago, when the practise of building operations in Chicago was much cruder than it is at present, one of the basement piers in a large building in process of erection began to show signs of such manifest weakness that the authorities interfered, the superstructure was shored up, and the pier was taken down. Investigation showed that the outside course of brick all around was laid up in admirable manner, but the inside of the pier was a mere mass of bats and a slight sprinkling of mortar. This is an extreme case, but in a very much less scale it is very apt to be duplicated in many buildings. The average brick mason will care enough for appearance to build the outside all right, but there seems to be a tradition among masons that mortar can be slighted on the joints that are hidden, and that if the space is simply filled up with brick, that is sufficient. As a matter of fact, the reverse is just the case. The strength of a pier depends far more upon the mortar than it does upon the brick, and we will venture to assert that a pier of light hard brick laid up in Portland cement mortar will be far stronger than a pier built of the very best quality of hard burned brick which is laid up with indifferent mortar sparingly applied. The only way to build a pier properly is to have the courses run clear through. The practise of grouting was formerly much more prevalent than it is now. If judiciously employed, grouting strengthens a pier immensely; not that the grouting of itself is as good as mortar, but because the chances are the joints will be more thoroughly filled; but at the same time, if the bricks are thoroughly rubbed in at each course, and plenty of mortar used so each brick is surrounded by it, the resulting pier will be a great deal better than one in which less mortar and more grout is used. The secret of all good brickwork is to preserve a thorough bond, and to use plenty of the right kind of mortar.

METHODS OF BEDDING BRICK.

ONE of the papers read before a recent meeting of the Architectural Association of Great Britain dealt with the materials employed by bricklayers and the methods of using them. While the subject is treated from a purely English point of view, many points touched upon are of interest to American readers, and we present the following extracts: I have often found that the quality of the sand used for building purposes does not receive the attention it deserves. A clean, sharp sand is essential to the making of good mortar, whether mixed with lime or cement. The many impurities to be found in sand must act injuriously and tend to detract from the strength of the mortar. The best way to avoid this is to wash the sand, but the expense attached to this process prevents its general adoption. Where a mortar mill is used the "clinkers" from a dust destructor, mixed in reasonable quantities with sand and lime or cement, make a good mortar. But it is always an important point to see that a proper proportion of lime or cement is used, which is not always done.

I think it is essential (except during the winter months) that bricks should be well wetted before being laid. This is all the more necessary where cement mortar is used. The only possible way to secure strong work is to "grout" each course of brickwork, and this is where the advantage of washed or well-screened sharp sand is seen, as it will more readily fill the open joints of the brickwork. The plastering of mortar on the top of each course will not do. But the fact that wet bricks make bricklayers' fingers sore may have something to do with the neglect of wetting bricks. In work that is to be pointed after the building is erected the joints should be raked out one half inch deep and well brushed off with a hard broom, to clear away all loose mortar, and the pointing should be well pressed or "ironed" in the joints. In glazed or enameled work it may be often noticed that after a time the "glaze" flakes off and the defective part appears black. This is very often due to using chipped or defective bricks; but it is also due sometimes to another cause — viz., the mode of bedding them. The bricks having two deep "frogs" and generally being laid in a close joint, care is not always taken that sufficient mortar is spread to insure the frogs of the brick being solidly filled, so that when the weight comes on the wall the pressure is largely on the outer edge of the brick, and causes the "glaze" to fly. One way to obviate this is to fill the frogs before laying the bricks. Another way is to joggle either the end or side of the brick before bedding, and fill or "grout" them up with liquid mortar. The conditions of present day building often compel builders and others to carry on their works in sections. Very often walls are built with a vertical "toothing." If this cannot be avoided, I think the connection or making good to such toothing should be done with cement.—*Carpentry and Building.*

Recent Brick and Terra-Cotta Work in American Cities, and Manufacturers' Department.

NEW YORK.— The election is over, and Robert A. Van Wyck, the Tammany candidate, has been chosen first mayor of Greater New York. A great deal of speculation is being indulged in among architects and builders as to the personnel and conduct of the new Department of Buildings, which will have, after January 1, jurisdiction over a city containing 360 square miles; and as we are confidently looking forward to a busy year, the department will have enough to do, and will need at its head men of more than ordinary skill and resource.

RESIDENCE OF DURBIN HORNE, ESQ., PITTSBURG, PENN.
Peabody & Stearns, Architects.

The official figures of the department, showing the amount of building operations transacted during recent years, are as follows: In 1895 there were 3,206 plans filed, aggregating $72,932,220; and in 1896, 3,848 plans, aggregating $84,068,228. In the first nine months of 1897 there were 2,713 plans filed, aggregating $71,326,605, so that the present year promises to be the most prosperous of all.

Simultaneously two large hotels, one for the accommodation of the wealthy, the other for the reception of the impecunious tradesman and labor, were opened last week. The first, the Astoria, in Fifth Avenue, is the largest and most beautiful hotel in New York. The interior is planned and decorated on a very lavish scale, the magnificent mural paintings being especially attractive. The exterior is a pleasing combination of red brick and Lake Superior red sandstone in the Flemish style, and although it does not join well with the Waldorf next door, it is an impressive building.

The second hotel is known as Mills House, No. 1, and is located on Bleecker Street, in a poor neighborhood. This building was built by Mr. D. O. Mills, from plans drawn by Ernest Flagg. It is a dignified building in the modern French style, with white brick and white stone trimmings. It is a very comfortable, almost luxurious home for the poor man, who can secure a lodging for a night, with bath, etc., for twenty cents, and the owner figures that the enterprise will pay expenses.

A remarkable feat was accomplished recently in New York which no doubt will interest readers of THE BRICKBUILDER.

A five-story brick tenement house, weighing 1,700 tons, was moved a distance of 30 ft. without so much as disturbing a single brick in the entire building.

The undertaking was fraught with many difficulties, but was undertaken and accomplished by W. K. Clynes, a contractor. The actual work of moving the building occupied six hours. Three weeks were spent in getting things ready.

Plans for the new building to be erected by the New York Medical College and Hospital for Women, in 101st Street, east of Manhattan Avenue, have been prepared by Wm. B. Tuthill. They provide for an eight-story fire-proof building, with a front of brick, terra-cotta, and limestone, which it is estimated will cost $90,000.

Plans have just been completed by C. B. J. Snyder, architect of the Board of Education, for two new school buildings. One to be located on 108th and 109th Streets, near Amsterdam Avenue, will be five stories, fire-proof, steel skeleton construction, exterior to be granite, limestone, gray brick, and terra-cotta. It will cost $300,000.

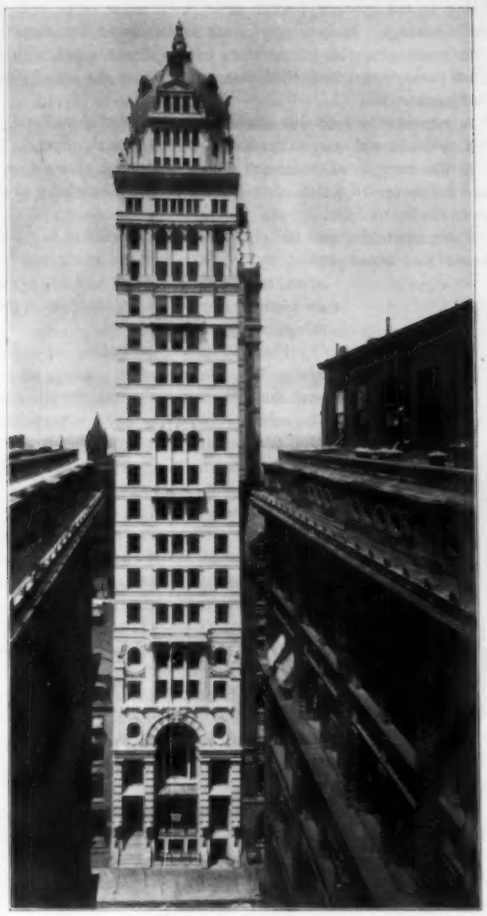
The other will be erected on 89th Street, between Amsterdam and Columbus Avenues. It will be of brick and stone, and will cost $233,000.

F. C. Zobel, architect, has prepared plans for an eight-story brick and stone store and loft building to be built on 19th Street, near Fifth Avenue, at a cost of $150,000.

Neville & Bagge, architects, have planned eight five-story brick and stone flats and stores to be built on Willis Avenue, near 140th Street; cost, $150,000.

James W. Cole, architect, has planned two five-story brick and stone flats and stores to be built on 92d Street, corner Columbus Avenue; cost, $65,000.

RESIDENCE OF DURBIN HORNE, ESQ., PITTSBURG, PENN.
Peabody & Stearns, Architects.



COMMERCIAL CABLE BUILDING, BROAD STREET, NEW YORK CITY.
LOOKING FROM COURT OF THE MILLS BUILDING.
Harding & Gooch, Architects.
The white brick used in the façades of the building were manufactured by Sayre, Fisher & Co.

Wm. J. Fryer, architect, is preparing plans for an eight-story fire-proof office building to be built on Greenwich Street, corner Laight Street, taking the place of the building recently destroyed by fire. The cost will be $80,000.

CHICAGO. — The dulness existing in building is emphasized by the eagerness with which important firms seek unimportant work. Small contracts are followed up and courted by concerns who would have thought them not worth looking after three or four years ago. Although every one is anticipating better things just ahead of us, yet the records show for last month only a little improvement over the corresponding month last year when the presidential election was uppermost.

The annual exhibition of paintings at the Art Institute divided honors with the Horse Show lately, though it must be admitted the latter had decidedly the "swellest" crowd in attendance. The exhibition was considered a good one, and it was so overcrowded that a little more weeding might have been indulged. And yet, curiously enough, it is a conspicuous fact that a dozen of the best American artists were entirely unrepresented. Pittsburg held her exhibition at the same time, and her art endowment fund and better field of purchasers proved to offer superior attractions in the way of prizes and sales.

There is a rumor or two of an important building, but no specially interesting news. The government building foundation work, under the direction of General Sooysmith, is making rapid progress. The piling was driven first for the lofty central part, the steam drivers pounding and hissing busily night and day. Now the grillage and the concrete, and finally great pyramids of dimension stones are approaching the street levels, and the pile drivers have worked around toward the circumference of the surrounding groups of lesser foundations. The scene is an unusually interesting one for the student, and classes from the architectural department of the Art Institute make periodical visits under the guidance of an instructor.

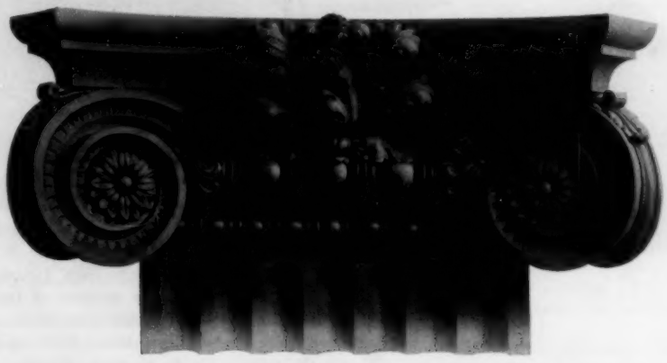
The Chicago Architectural Club is promising to be active in its realm this year. It has a competition on now for an architects' club house. Mr. W. A. Otis recently gave a lantern talk on The Development of Architecture, and on another occasion the new president, E. G. Garden, exhibited working drawings of the Public Library Building, which were furnished through the courtesy of Messrs. Shepley, Rutan & Coolidge. The drawings were discussed, also, by Mr. F. M. Garden, who superintended the construction of the building.

BOSTON. — The remarkably open weather which has fallen to the lot of New England this fall has allowed almost uninterrupted work on buildings under process of construction. In consequence, these structures begun in early summer have pushed rapidly ahead, and are now, many of them, nearly roofed in and ready for interior finish. These later additions to the business blocks of the city are, as a rule, full of architectural dignity and grace. As they have approached completion, the old-time buildings in their immediate neighborhood have, by contrast, taken on a shabby aspect indeed.

THE REIBOLD BUILDING, DAYTON, OHIO.
Williams & Andrews, Architects.
The front of this building is of cream-colored terra-cotta. Executed by the Indianapolis Terra-Cotta Company, Brightwood, Ind.

The inevitable result of this will be the gradual rebuilding of the business district. Already many of the adjacent property owners are considering the erection of new structures.

While the building industry in every city suffers periodically to a greater or less extent from the wiles of the speculative builder, yet Boston has been this season particularly afflicted in this respect. To such an extent have material men been victimized by these worthless operators that most of them now refuse to do business with any speculative building whatsoever, unless cash is paid on delivery of material. In some of the other cities the material men have, by combining and refusing to sell other than absolutely responsible parties, succeeded in shutting off this most undesirable class of builders. It would be a wise move on the part of the material men here if they would affect a like combination.



CAPITAL TO PILASTERS, FLANKING ENTRANCE GEORGE GOULD RESIDENCE, LAKEWOOD, N. J.
Bruce Price, Architect.
Executed by the Perth Amboy Terra-Cotta Company.

In spite of the opposition and heated arguments which some of our good citizens have brought to bear against the erection of the new Westminster Apartment Hotel at Copley Square, because of the tendency of its towering height to dwarf the superb architectural proportions of Trinity Church and other adjacent structures, the enterprise has gone rapidly forward, and the foundations are about being laid. The estimated cost of the building is an even million dollars. It will be ten stories in height, of fire-proof construction. Up to the third story the material will be of buff Indiana Bedford stone and granite. The succeeding stories will be of Roman brick and highly sculptured terra-cotta. The roof will have a tile covering. Henry E. Cregier, of Chicago, is the architect; Woodbury & Leighton, of Boston, are the builders.

Among the new buildings now under process of construction or soon to be erected may be mentioned a new building for Jordan & Marsh, located on Avon, Bedford, and Chauncy Streets. This is to be an extension of their present retail store. Winslow & Wetherell, architects. To be constructed of brick and terra-cotta a new structure to be erected at the corner of Purchase and Federal Streets and Atlantic Avenue, on the property recently acquired by Wood, Pollard & Co. Plans for this building are being drawn by Shepley, Rutan & Coolidge, and it is rumored that the building is to be a fine hotel. The site of the property being directly opposite the New Terminal Station, gives some ground for this statment.

There will be an addition the first of the year to the Homeopathic Hospital, East Concord Street, Boston; H. K. Hilton, architect, Providence, R. I. To be constructed of brick and terra-cotta.

A nine-story business block will be built by the Boston Wharf Company; M. D. Safford, architect. To be constructed of brick and terra-cotta.

Six houses on the Bay State Road, Mr. Geo. W. Wheatland, owner; H. D. Hale, architect. To be constructed of brick and terra-cotta.

New schoolhouse for the city of Haverhill. Plans in competition among Haverhill architects. To be constructed of brick and terra-cotta.

A stable on Troy Street, R. H. White & Co., owner; Peabody & Stearns, architects. To be constructed of brick.

New schoolhouse for the Roxbury district; Andrews, Jaques & Rantoul, architects. To be constructed of brick and terra-cotta.

New schoolhouse for South Boston; H. D. Hale, architect. To be constructed of brick and terra-cotta.

New schoolhouse for East Boston; architect for which has not been appointed.

$100,000 hospital at Attleboro, Mass., Dr. J. M. Solomon, owner. Architect not given out.

$100,000 business block at Hartford, Conn.; Isaac Allen, architect. To be constructed of brick and stone.

New $75,000 dining hall for Harvard College, Cambridge, Mass.; Wheelwright & Haven, architects. To be constructed of brick and stone.

A new hospital at West Newton, Mass.; Rand & Taylor, Kendall & Stevens, architects. To be constructed of brick and stone.

Parochial residence at Woburn, Mass.; W. H. & J. A. Maginty, architects.

$75,000 apartment house at Brookline, Mass.; J. P. & G. H. Smith, architects. To be constructed of brick.

A mammoth apartment hotel on Commonwealth Avenue; Arthur Bowditch, architect; Webb Granite Construction Company, builders. This job was projected last year, but was laid over until the present time. It is now reported that work will shortly be begun on same.

A new apartment house, Springfield, Mass.; H. H. Gridley, architect. To be constructed of brick and stone.

New engine house, Salem, Mass.; Bickford & Graves, architects. To be constructed of brick and stone.

A $200,000 apartment house, Providence, R. I.; Martin & Hall, architects. To be constructed of brick and stone.

Two residences on Commonwealth Avenue; R. C. Sturgis, architect. To be constructed of brick.

A $100,000 combination store and apartment block at Lowell, Mass.; Merrill & Clark, architects. To be constructed of red brick and terra-cotta.

TERRA-COTTA PANEL, RESIDENCE, JERSEY CITY, N. J.
Executed in terra-cotta by the Conkling, Armstrong Terra-Cotta Company.

ST. LOUIS. — No small interest has been taken by some of the architects in the competition for the new City Hall that is about to be built by our neighbor across the river, East St. Louis, to replace the one destroyed by the cyclone in May of last year. Some seventeen sets of drawings were submitted, and those of Architect E. Jansen selected by the committee as, in their opinion, being the

best suited to the needs of their city. Architects May and Wees, of this city, and Meuller, of East St. Louis, were each awarded prizes. The terms of the competition were much more satisfactory than is usual in such cases, and were such as might be used in competition in the Ecole des Beaux Arts. The design selected is French Renaissance, and provides for the city offices on the first floor and base-

TERRA-COTTA DETAIL.
Executed by the Northwestern Terra-Cotta Company.

ment, the city court and council chambers, with committee rooms, judge, and jury rooms, etc., on the second, while the third floor is to be used for a large hall. The cost will be about $80,000.

Owing to the fact that the enterprising little city has been trying to raise herself out of the mud by raising the streets 8 to 12 ft. above the grade, she found herself without the means to rebuild after the storm, the limit of taxation permitted by law having been reached. To relieve their city of its embarrassment, public-spirited citizens came forward and furnished the money, the city to repay them in an annual rental.

An interesting old landmark, the Wabash Building, which was used for so many years by the Board of Education and Public Library, was destroyed by fire the latter part of last month.

A bill has been introduced into the House of Delegates to give a ninety-nine year lease of the site of our present court house to a syndicate, which proposes to erect thereon a ten-story building, covering the entire block, the building to be arranged for the courts and public offices on the upper floors, and the other floors for offices suitable for lawyers, etc. The scheme has been up for consideration before, but has assumed more tangible form, and has brought forth considerable comment.

There has been no material change in the outlook during the last month, the amount for building, according to the report of the building commissioner, being even less than for the same month last year.

MEMPHIS.— THE BRICKBUILDER has published from time to time the outlook for building East, West, and North, but has little to say of the vast amount of work continually going on in the South, where the use of brick and terra-cotta in the construction of buildings large and small justifies at least an occasional item of recognition in its columns.

The new City Hospital Buildings now under way, which will cost when completed $200,000, were designed by Architect Samuel Patton, deceased, of Chattanooga. Mr. Patton lost his life in a Chattanooga, Tenn., fire, and thereby hangs an interesting story. Mr. Patton's rooms were in the Richardson Building, and he could easily have saved himself but for the fact that he made an effort to get his drawings for the proposed new Capitol Building of Mississippi, before leaving the burning building. The Governor of Mississippi had vetoed the bill authorizing the adoption of Architect J. Riley Gordon's plans for the capitol, which had been selected from ten or fifteen competitive sets, Mr. Patton's being among the number. Mr. Patton had gone to much trouble and expense in making a second set of drawings, and his anxiety to save these drawings cost him his life. It might be mentioned here that the State of Mississippi contemplates the erection of a $1,000,000 capitol, which will doubtlessly be thrown open again to competition, as the legislature and Governor could not agree at the last meeting.

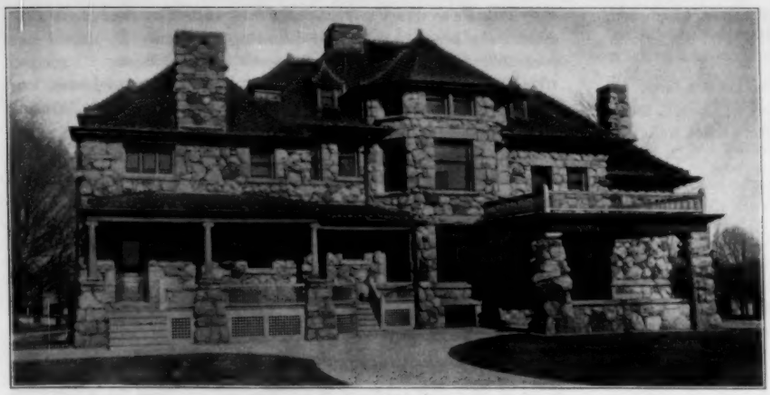
The new Memphis Market House and Cold Storage Building, also under way, involves the expenditure of about $75,000 and will be completed in the early spring. The plans were furnished by Alsup & Johnson, architects, of Memphis, who were paid 2½ per cent. for their drawings, and the contract for superintendence given to another firm of architects, Weathers & Weathers, of this city. A councilman attempted a bribe when the contract for plans was first awarded, was sentenced to a heavy fine, and ousted from the city council. The employment of one firm for plans and another for superintendence is certainly an innovation in this part of the country, and shows a few of the peculiar methods of public "jobbing" practised North as well as South.

Few cities can boast of as rapid progress in the building of costly city residences as Memphis. Within the last year at least a dozen homes have been built that would grace the principal thoroughfares of any of the larger cities. A "costly" residence with us means the expenditure of from $50,000 to $75,000 exclusive of lot and furnishings. The majority of these houses are built of brick and stone, and in only one instance has the colonial style been closely followed. Architects Dodd & Cobb, of Louisville, Ky., elaborated their design for the Kentucky Building at the World's Fair, and from these plans has been erected one of the finest and costliest examples of colonial work in the South. I mention the use of colonial work because no other style is so peculiarly adapted to our climate, and with so many beautiful examples all around us it is a wonder that the style should be almost entirely abandoned by Southern architects. What might be termed the "castellated style" has been the theme for most of the "costly" houses, and miniature turreted castles have grown up all about us. The only serious objection to this so-called style is the peculiar appearance that the enormous verandas and uncovered "porches" give to the house.

The much-debated question of licensing architects brings to mind the fact that architects in Memphis, until last year, were required to pay a city and county tax amounting to nearly $100. We are by no means exempt from the combined "contractors and architects," however, and their methods are much the same here as elsewhere; but when it comes to unique methods of advertising, we hold

TERRA-COTTA DETAILS, APARTMENT HOUSE, CHESTNUT STREET, PHILADELPHIA.
Walter Smedley, Architect.
Executed by the Conkling, Armstrong Terra-Cotta Company.

the record. A draftsman for one of the firms of contractors here has branched out for himself with this startling sign,— "Expert, Practical Architect and Scientific Housemover," — displayed on the private residence of the "architect." His own house is only half completed, but in its half-finished state is proudly shown by the possessor as an instance of what can be done toward building a $5,000 house with $1,000. This "scientific housemover" also has his startling "ad" painted in conspicuous letters on his buggy — but, to be more exact, his vehicle.



RESIDENCE OF A. B. GARDINER, DOWAGIAC, MICH.
W. K. Johnston, Architect, Chicago.
Roofed with 8 in. Conosera Tile, made by Celadon Terra-Cotta Company.

Not only has Memphis made rapid strides in the way of office buildings and handsome residences, but also Atlanta, Nashville, Louisville, and Chattanooga. In fact, the South offers a field of labor for the architect that allows him scope for nearly every style and class of building, and we are welcoming the extensive and substantial use of materials in clay which until recently played a very small part in the upbuilding of our cities.

THE accompanying cuts show two elevations of residence, and one of stable, designed by Architect W. K. Johnston, Chicago, for Mr. A. B. Gardiner, at Dowagiac, Mich., which are roofed with 8 in. Conosera tile and graduated tower tile, manufactured by Charles T. Harris, lessee of the Celadon Terra-Cotta Co., at Alfred, N. Y.

The walls are of field boulders laid up rough as shown, and the effect in connection with this style of tile roof is very artistic.

But the picture can give no impression of the fine color scheme secured; these broken boulders are of a great variety of color tones, and the roof is a warm red, thus securing a sky line in perfect accord with the building material and its surroundings.

STABLE, A. B. GARDINER, DOWAGIAC, MICH.

RESIDENCE OF A. B. GARDINER, DOWAGIAC, MICH.
W. K. Johnston, Architect, Chicago.
Roofed with 8 in. Conosera Tile, made by Celadon Terra-Cotta Company.

INTERESTING NEWS ITEMS.

THE DAGUS CLAY MANUFACTURING COMPANY, Daguscahonda, Penn., will furnish the buff brick for the new Warren High School, Warren, Penn.

THE CUMMINGS CEMENT COMPANY, of Akron, N. Y., is furnishing large quantities of Rock and Portland cements for work on the Erie Canal improvements.

THE POWHATAN CLAY MANUFACTURING COMPANY are supplying their gray bricks for the New Smithdeal Business College Building, Richmond, Va.

THE PANCOAST VENTILATOR COMPANY are putting upon the market a handsome new square ventilator for buildings. Also a window ventilator known as the "Common Sense."

W. S. RAVENSCROFT & Co., brick manufacturers, Daguscahonda, Penn., have changed the company name to the Dagus Clay Manufacturing Company.

CHARLES E. WILLARD has secured the contract to supply the mottled brick on the Vega Society Building, New Britain, Conn.; W. H. Cadwell, architect, New Britain.

THE STANDARD TERRA-COTTA COMPANY, Perth Amboy, N. J., have increased their pressing department by adding a new building 110 by 50 ft.

SAYRE & FISHER COMPANY have the contract to furnish a large quantity of

white enamel brick for new residence of George Gould, Lakewood, N. J.; Bruce Price, architect.

THE Bolles Sliding and Revolving Sash have been ordered for the Citizens' Bank Building, Norfolk, Va.; Charles E. Cassell, architect, Baltimore, Md. This is a handsome seven-story office building.

THE PANCOAST VENTILATOR COMPANY furnished the large copper ventilators for the Astoria Hotel, New York City; also the ventilators for the Manhattan Beach Theater, at Staten Island.

SAYRE & FISHER COMPANY are supplying 300,000 gray bricks and 1,500,000 hollow bricks for the new thirty-story Park Row Building, New York City, of which R. H. Robertson is the architect.

THE UNION AKRON CEMENT COMPANY, Buffalo, are furnishing the Owego Bridge Company with the Star Brand Akron Cement for abutments to bridges at Mt. Morris, N. Y., and at Rockland, N. Y., also for foundation for asphalt pavement at Warren, Ohio.

FALL trade in fancy brick is reported exceedingly good by Messrs. Fiske, Homes & Co. Sales are largely in excess of last year, and future outlook for business in their high-grade specialties is quoted as very good.

G. R. TWICHELL & Co., Boston, are to supply face brick on the following work: Addition to the Chestnut Hill Pumping Station, Boston; building for fire department headquarters, Worcester, Mass. and Somerset Trust Building, Boston.

H. F. MAYLAND & Co., New York, representatives of the Burlington Architectural Terra-cotta Company, have secured the contract for furnishing the terra-cotta for a new store building in Brooklyn, of which C. F. Guyler is the architect.

RECENT inquiry at Cornell University elicited the information that the Cabot's Brick Preservative used upon several of the most prominent buildings several years ago had proved most satisfactory, thoroughly waterproofing the bricks and retaining its efficacy.

THE EXCELSIOR TERRA-COTTA COMPANY have secured through their New England representative, Charles Bacon, the contract to supply the terra-cotta for six houses on the Bay State Road. George Wheatland, owner; H. D. Hale, architect; W. D. Vinal, builder.

MR. GEORGE B. F. MAXWELL has assumed the sole agency, for Philadelphia, of the products of the American Mason Safety Tread Company, of Boston. Mr. Maxwell is widely known as having been for the past ten years designer and salesman of church and lodge furniture for the firm of S. C. Small & Co., of Boston.

CONKLING, ARMSTRONG TERRA-COTTA COMPANY have secured through their New England agent, Charles E. Willard, the contract to supply the terra-cotta on the Dedham High School building, Dedham, Mass.; Greenleaf & Cobb, architects, Boston. Also the Sage-Allen Office Building, Hartford, Conn.; Isaac Allen, architect, Hartford.

THE RARITAN HOLLOW AND POROUS BRICK COMPANY, New York, are furnishing "Raritan" 12 in. mottled brick in a run of color for a large church in 88th Street, New York City. The molded work in this job is very elaborate, especially the Gothic arches for the cloisters. It is a fine example of the use of brick in church architecture.

THE FAWCETT VENTILATED FIRE-PROOF CONSTRUCTION COMPANY have been awarded the following contracts: Structural steel and fire-proofing for the new Masonic Temple, Boston; structural steel and fire-proofing for the Westminster apartment house, Boston; structural steel and fire-proofing for Mr. Winslow's (Winslow & Wetherell) residence, Boston.

SAYRE & FISHER COMPANY have secured through their New England representative, Charles Bacon, the contract to supply the brick for six houses on the Bay State Road. George Wheatland, owner; H. D. Hale, architect; W. D. Vinal, builder. Also the white enameled brick to be used in the Dean Building on India Street. Hartwell, Richardson & Driver, architects; George A. Fuller & Co., contractors.

THE AMERICAN MASON SAFETY TREAD COMPANY is placing strips of its safety material in a granolithic sidewalk on a steep incline on Bowdoin Street, adjoining the State House grounds, Boston, rendering the sidewalk perfectly non-slipping even in the most frosty weather. This use of the safety tread seems likely to become very largely adopted, as it enables the use of granolithic in places where it has been heretofore impracticable.

THE BURLINGTON ARCHITECTURAL TERRA-COTTA COMPANY, Burlington, N. J., have supplied terra-cotta on the following contracts: New building, Penn Institution for the Blind, Overbrook, Penn.; Cope & Stewardson, architects; residence at Overbrook, Penn.; Kean & Mead, architects; business front, Chestnut Street, Philadelphia; H. E. Fowler, architect; Hospital for Deaf Mutes, Trenton, N. J.; Thomas Stephen, architect; apartment house, Girard Avenue, Philadelphia; S. A. Stoneback, builder.

MEEKER, CARTER, BOORAEM & Co., New York, have closed contracts for 150,000 standard buffs, Hotel, 33d Street, near Broadway; H. J. Hardenbergh, architect; C. T. Wills, contractor; 125,000 standard gray bricks, apartment houses, 138th, 139th Streets, and Brook Avenue; Schickel & Ditmars, architects; A. A. Smith, contractor, and are now delivering white semi-glazed bricks and gray bricks to office building, 9-11 Maiden Lane; C. A. Cowen, contractor; R. S. Townsend, architect, all of New York City.

THE HAMBLIN & RUSSELL MANUFACTURING COMPANY, of Worcester, Mass., have appointed Fiske, Homes & Co., of 164 Devonshire Street, Boston, Mass., as their general agents on Standard Wall Ties, Slate Fasteners, and Wind Guards. Illustrated catalogues setting forth the Standard clinch system and the new method of slate roofing will be forwarded upon application. This system seems to be quite a step in advance of the old methods, and without doubt it will meet with ready approval, and a thorough investigation is invited to all interested in this line.

THE POWHATAN CLAY MANUFACTURING COMPANY, Richmond, Va. (New York office, Townsend Building), have sent us five sample brick, which are certainly worthy of the highest recommendation as being particularly fine specimens of their latest successes in gray and white brick. The general high reputation which the company's output has acquired among the building profession leaves little more to say of these samples than that they are, if possible, of a finer quality and more perfect shade than any which the company has before placed upon the market.

FISKE, HOMES & Co. report a good demand for their specialties, and have booked a large number of orders for fancy brick during the past few weeks. Among the more important are, the Westminster Chambers, Boston; High School, Needham; Fire Station, Dorchester; Richmond Court, Brookline; Pumping Station, Waterworks, Somersworth, N. H.; Warehouses on India Street,

city proper, and on A Street, South Boston; Y. M. C. A. Building, Fall River. Smaller orders include mercantile buildings at Salem, Beverly, Springfield, New Haven, Hartford, etc., with numerous apartment houses and private dwellings in and about Boston and throughout New England.

WILLIAM CONNORS, of Troy, N. Y., has purchased for $40,000 the Olympic Mill property, 669, 671, 673, and 675 River Street. This is one of the best manufacturing sites in Troy, and has been owned by Orrs & Co. since 1835. It has two large water wheels of 150 horse power each. Mr. Connors proposes to remodel the present building and equip it especially for the manufacture of American Seal Paint, and erect a separate building, which will be used exclusively for the grinding of dry colors. The machinery to be used in operating this plant will be entirely new, of which Mr. Connors is the sole owner and patentee. His method not only reduces the cost of production, but makes a much better article than can be produced by the present means.

THE HYDRAULIC-PRESS BRICK COMPANIES, through their New York and New England agents, Messrs. Fredenburg & Lounsbury, report the following contracts, pertaining to New England work only, that have recently been secured by them: Hotel, corner Beacon Street and Brookline Avenue, Boston, Mass.; Winslow & Wetherell, architects; Memorial Library, Adams, Mass.; William M. Butterfield, architect; Wellesley Chapel, Wellesley, Mass.; Heins & LaFarge, architects; apartment house, corner Beacon & Carlton Streets, Brookline, Mass.; Winslow & Wetherell, architects; Police Station, Hartford, Conn.; J. J. Dwyer, architect; New Bedford Pumping Station, New Bedford, Mass.; Rice & Evans, engineers; business block, Main Street, Hartford, Conn.; Isaac Allen, Jr., architect; engine house, West Roxbury, Mass.; John A. Fox, architect.

THE CELADON TERRA-COTTA COMPANY, Limited, Charles T. Harris, Lessee, has recently closed contracts for roofing tiles on the following: Seven houses for E. L. Schiller, 81st Street and West End Avenue, New York City; Clarence True, architect; style, 8 in. Conosera; Meter house and Office for Gas Company, Omaha, Neb.; Wilson Brothers & Co., Philadelphia, architects; style, open shingle; water tower at State Hospital, Massilon, Ohio; Yost & Packard, architects; style, graduated Conosera; residence for Isaac D. Fletcher, 813 Fifth Avenue, New York; C. H. P. Gilbert, architect; style, open shingle; two towers for H. C. Rutt, Passaic, N. J.; style, 8 in. Conosera; Y. M. C. A. Building, Mansfield, Ohio; C. H. Martin & Brother, architect; style, 8 in. Conosera; United States Post-Office Building and Court House, Paterson, N. J.; supervising architect; style, Gothic.

WE are in receipt of a very attractive catalogue of some fifty pages from the Eastern Machinery Company, New Haven, Conn., of their Improved Friction Clutches. We would recommend a perusal of this to those of our readers engaged in manufacturing, as being a very interesting little volume, full of information on this subject.

In it the principle on which their Improved Friction Clutches are constructed is described in a clear and concise manner, further explained by sectional cuts, etc. Besides pulleys for regular work, the company make a number of special pulleys, which are also described and illustrated.

The reputation for high-class machinery which this company has won for itself in connection with their line of clay machinery is certainly a guarantee as to the merits of their Friction Clutch Pulleys, and we are glad to recommend parties in need of same to correspond with them. Address, The Eastern Machinery Company, New Haven, Conn.

THE GRUEBY FAIENCE COMPANY have secured the contract to supply the enameled brick to be used on the new Subway station at Haymarket Square. This company have recently equipped their factory with new represses, and are making some new and very attractive designs for tile work. They have recently finished a particularly fine piece of work in special Moorish tile of a dull-finished Alhambra pattern for a bath room in the Moores' residence, in Detroit; A. W. Chittenden, architect. They have also supplied the faience work for an addition to the house of H. C. Warren, of an open loggia roof, supported by brick piers, between which are panels of blue Chinese tile, forming a balustrade. Capitals of these piers are made of gray, dull-finished fawn, to harmonize with the brickwork, the surface between the eaves being blue to match the tiles below. The frieze above is enlivened in color by different shades of tile, set between the consoles. The effectiveness of this combination is most artistic and attractive, and shows the possibilities that may be achieved in this direction by the use of faience in exterior decoration.

ATTENTION is called to what would seem to be a rare opportunity to acquire a most desirable modern brick plant in the heart of the clay-manufacturing district of Ohio. The owner of the plant is obliged to remove to Colorado on account of health, and is willing to dispose of the property at a "great bargain."

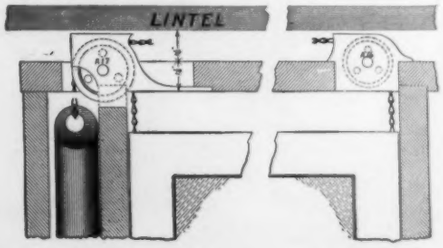
The product of this plant is well and favorably known in the market, and it has facilities for manufacturing and shipping that are particularly favorable. The location is on a belt line of railroad that connects with seven different systems, including the Baltimore & Ohio, and the Pennsylvania. We are informed that there are extensive beds of red and buff clays right at the works, and that the best coal can be obtained delivered at the kilns for $1.00 per ton.

The plant is equipped with six down-draft kilns (holding 800,000 brick) with exhaust fan system attachment, and has a daily capacity of presses of 30,000 brick. There is in stock a very large line of molded dies, claimed to be the most extensive in the State.

Any parties interested in acquiring a property of this kind should not fail to investigate this plant. For further particulars see advertisement on another page.

WHILE the building profession have for a long time recognized the mechanical advantage and economical saving in space of the overhead window pulley in comparison to the old style side pulley, yet in the past it was impossible to use them without making special provisions. This difficulty has been overcome by an ingenious device known as the "Queen" Overhead Pulley, a patent on which was granted last September to U. G. McQueen, Manager of the Queen Sash Balance Company, 150 Nassau Street, New York, N. Y.

The various objections to the old style of overhead pulley have been fully overcome in the "Queen," as may be seen by the accompanying illustrations. Some of the advantages claimed by the company for the Queen pulley are as follows: it can be placed in any window in which the ordinary side pulley can be used, at a gain of a large amount of pocket room, thus doing away with lead weights and reducing cost; no grooving of the sash is necessary, and no extra space for head room need be allowed. No iron or steel work

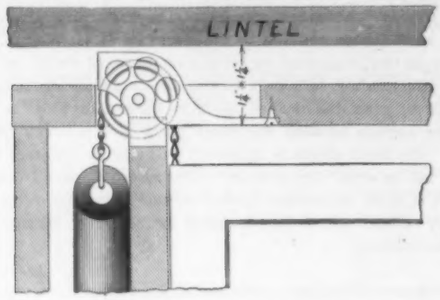


THE "QUEEN" MULLION FRAME PULLEY (ONE WEIGHT BALANCES THE SASH). THIS CUT SHOWS A 2½ IN. PULLEY.

in any building will in any way interfere with its perfect action, and it requires, at least, one inch less head room than any other overhead pulley.

All sizes, styles, and kinds of finish are given in the company's catalogue, and many of the best buildings now being constructed in New York are equipped with these pulleys. It has the endorsement of the leading architects.

The Mullion Frame Pulley, here shown, is designed to do away



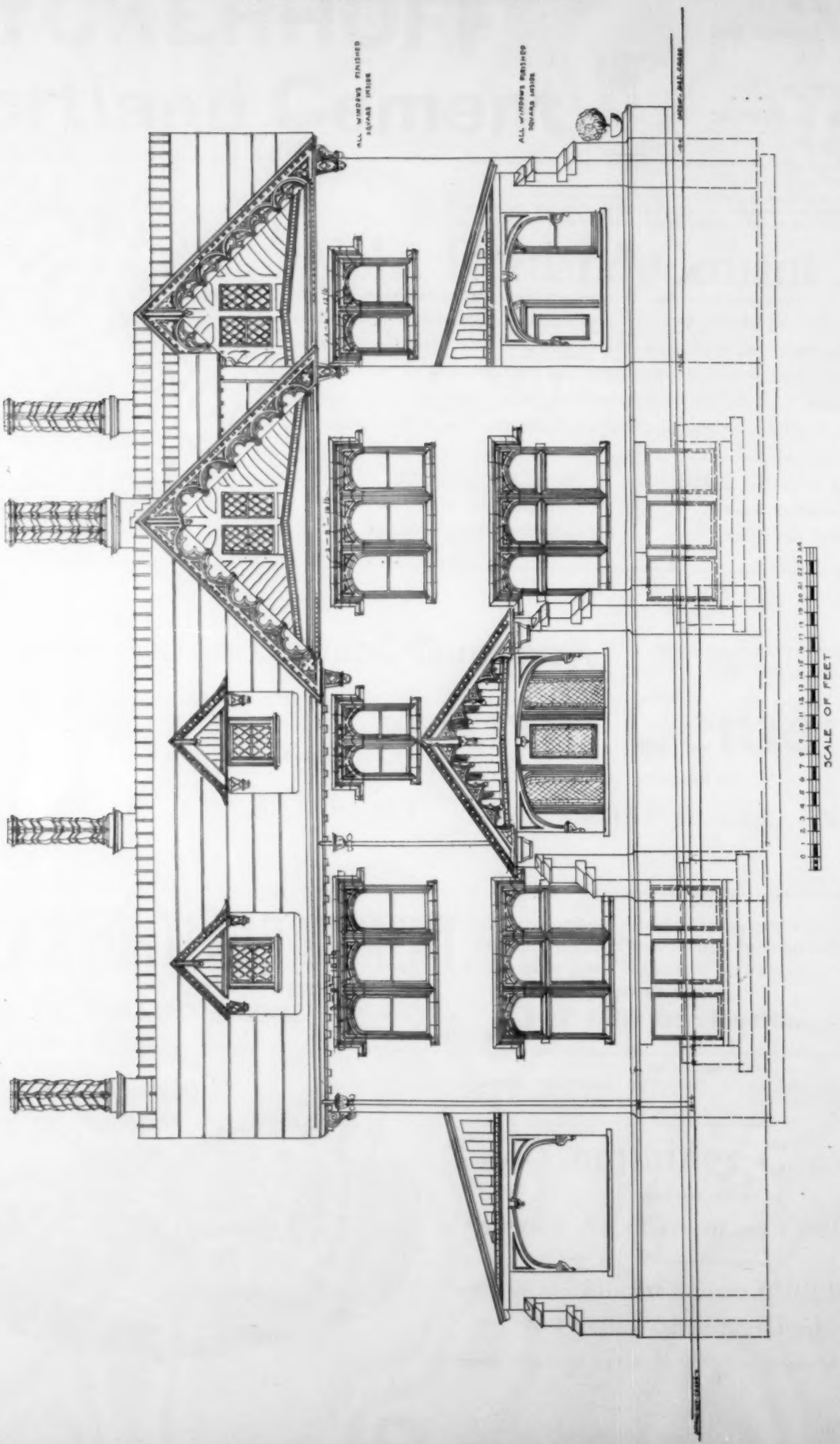
THE "QUEEN" SINGLE FRAME PULLEY. THIS CUT SHOWS A 2½ IN. PULLEY.

with the mullion pockets in twin windows. When these pulleys are used, the sashes are operated by one weight with the same result as by using two weights, and from six to eight inches more glass space is given than by ordinary methods.

"The difficulty heretofore experienced in threading overhead pulleys has been overcome by the 'Queen' pulley, and a new style of mouse for use in threading the pulley with cord, tape, or chain is furnished with each order."

The company will be glad to send a working model and catalogue to any architect, on application. All goods specified in the catalogue are kept in stock.

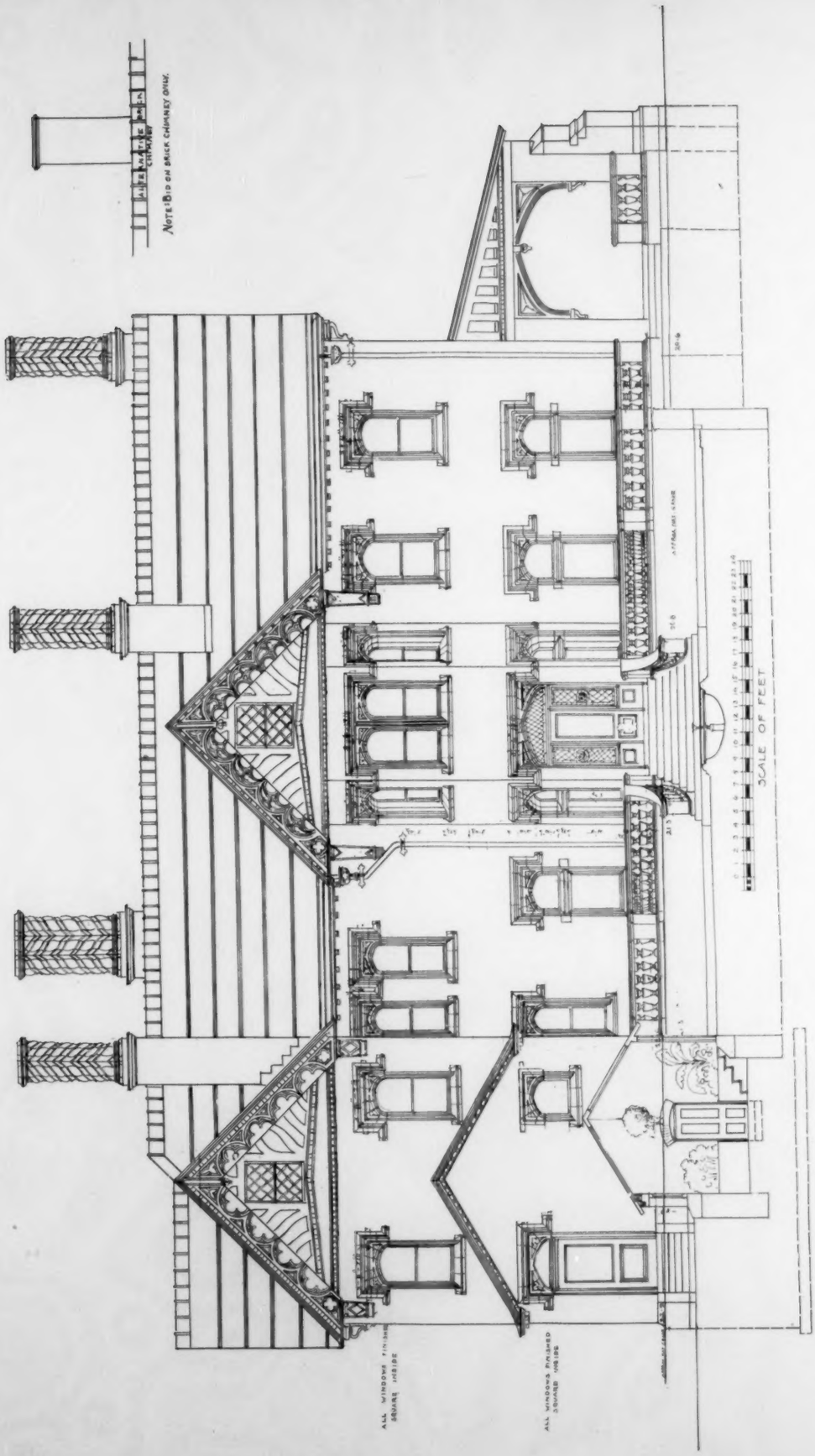
INDEX TO ADVERTISEMENTS.



NORTHEAST ELEVATION.

RESIDENCE FOR DURBIN HORNE, ESQ., PITTSBURGH, PENN.

PEABODY & STEARNS, ARCHITECTS.



SOUTHWEST ELEVATION.

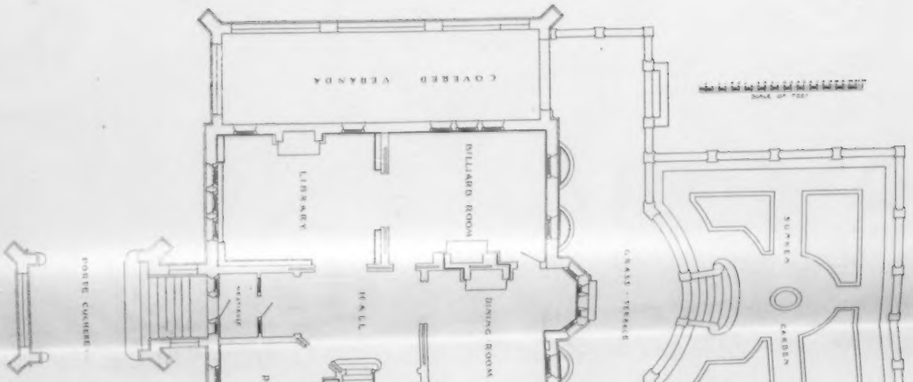
RESIDENCE FOR DURBIN HORNE, ESQ., PITTSBURGH, PENN.

PEABODY & STEARNS, ARCHITECTS.

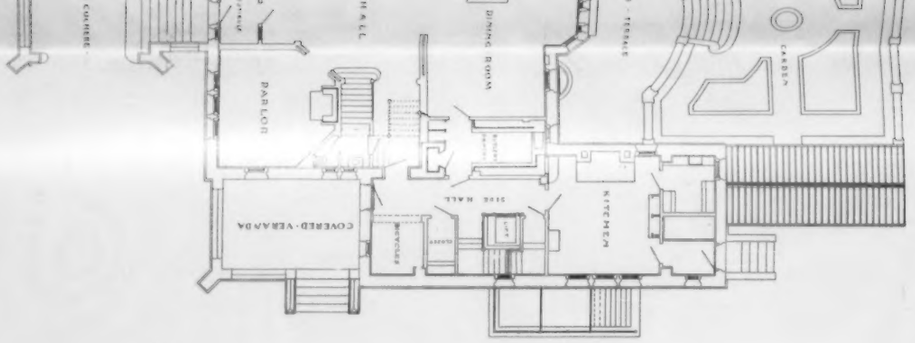
Southeast Elevation.

RESIDENCE FOR DURBIN HORNE, Esq., PITTSBURGH, PENN.

PEABODY & STEARNS, Architects.



THE BRICKBUILDER
VOL. 6. NO. 11.



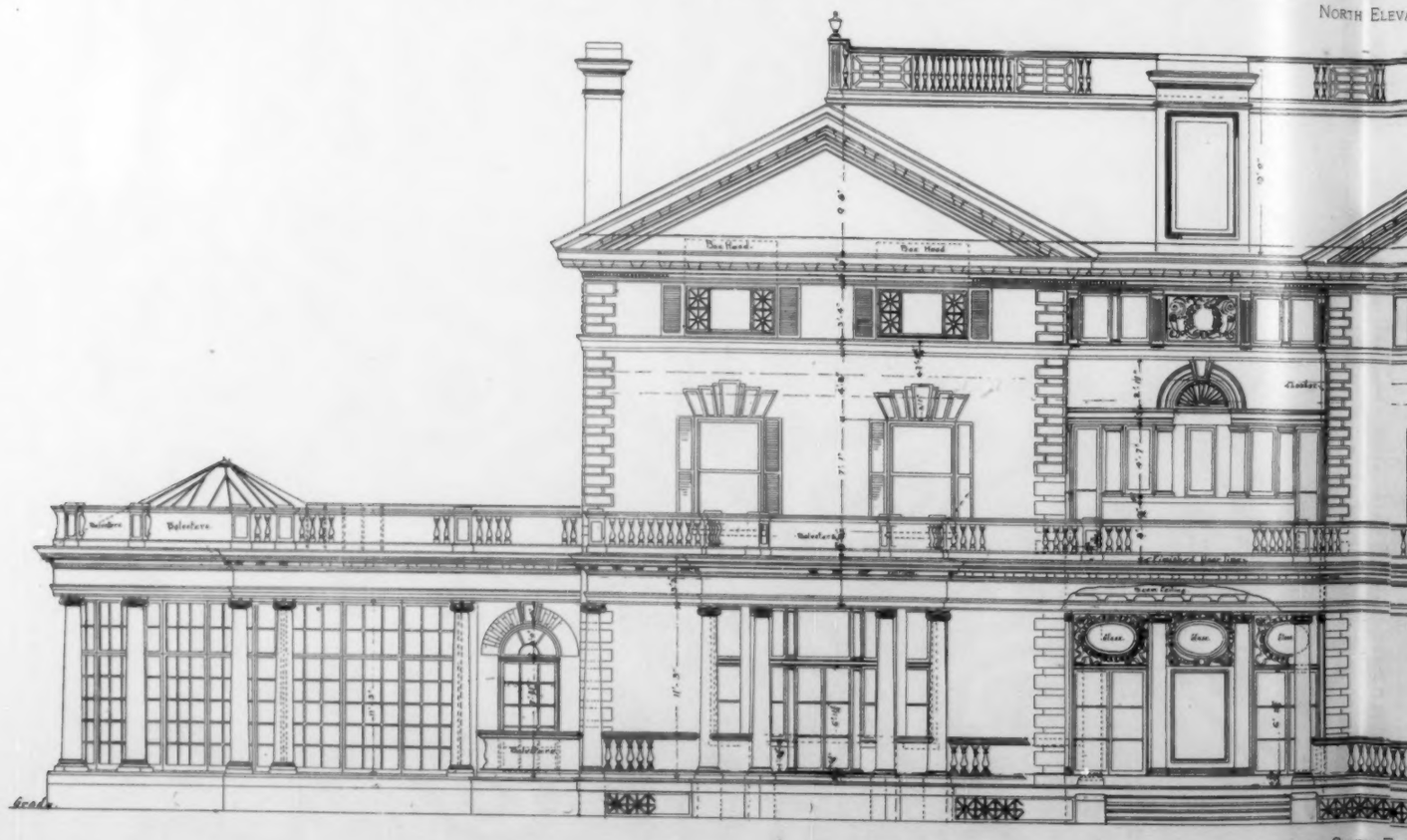
FIRST FLOOR PLAN.

NORTHWEST ELEVATION.

RESIDENCE FOR DURBIN HORNE, Esq., PITTSBURGH, PENN.

PEABODY & STEARNS, ARCHITECTS.

North Elev



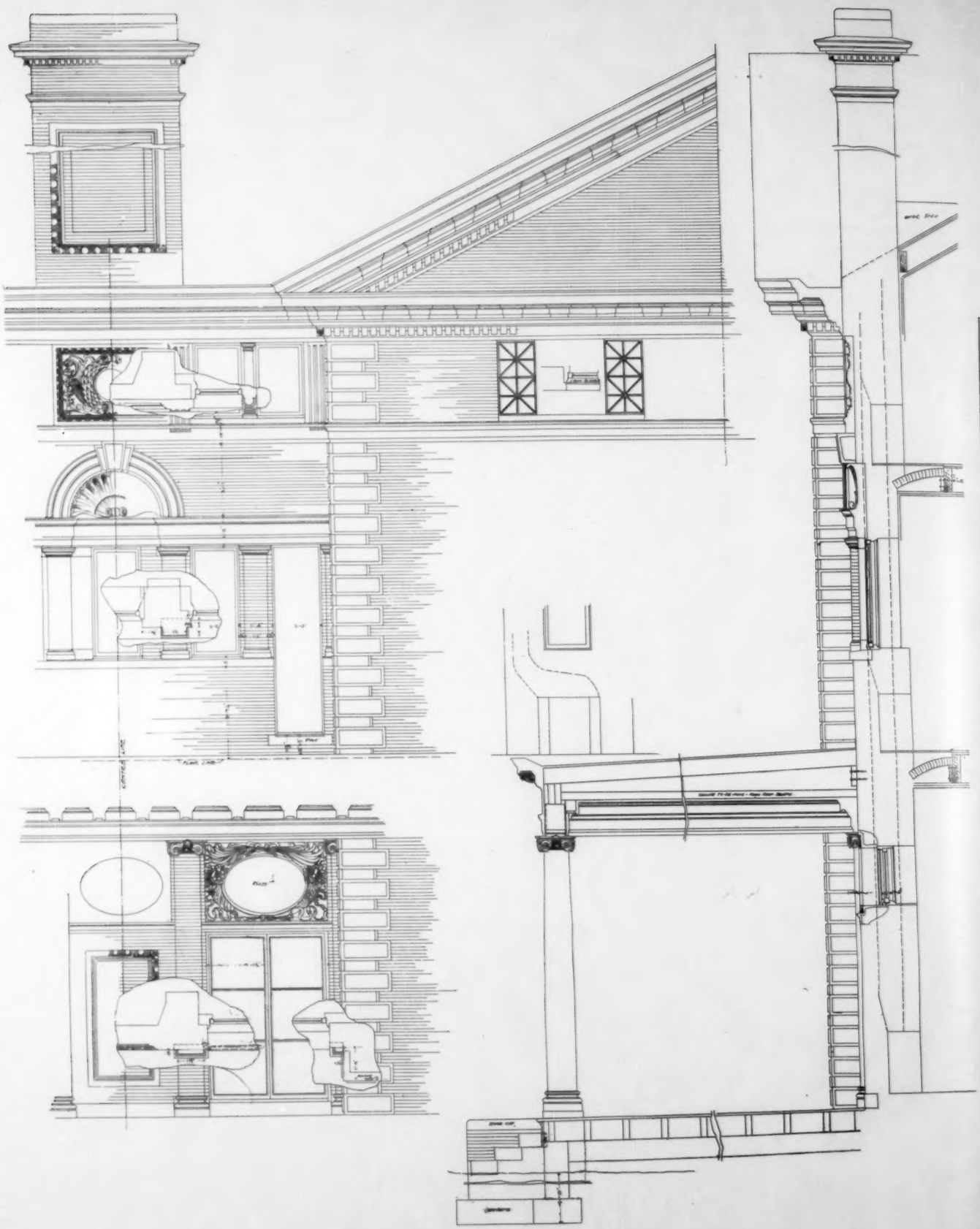
South El

RESIDENCE FOR FREDERICK P
RENWICK, ASPINWALL

NORTH ELEVATION.

SOUTH ELEVATION.

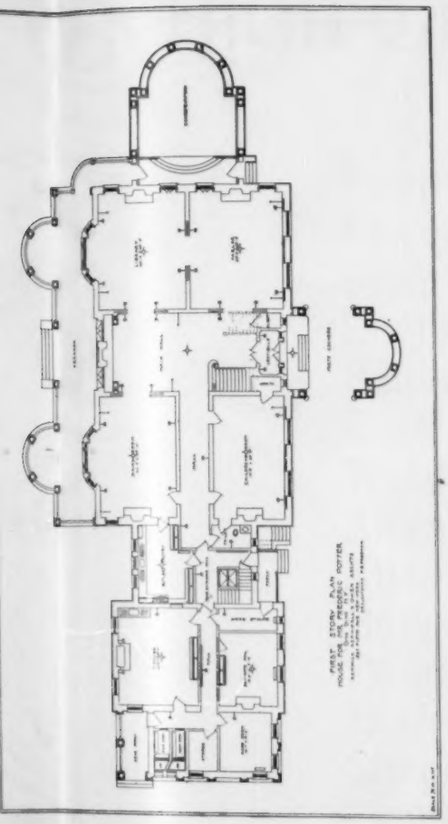
EDERICK POTTER, ESQ., SING SING, N. Y.
. ASPINWALL & OWEN, ARCHITECTS.

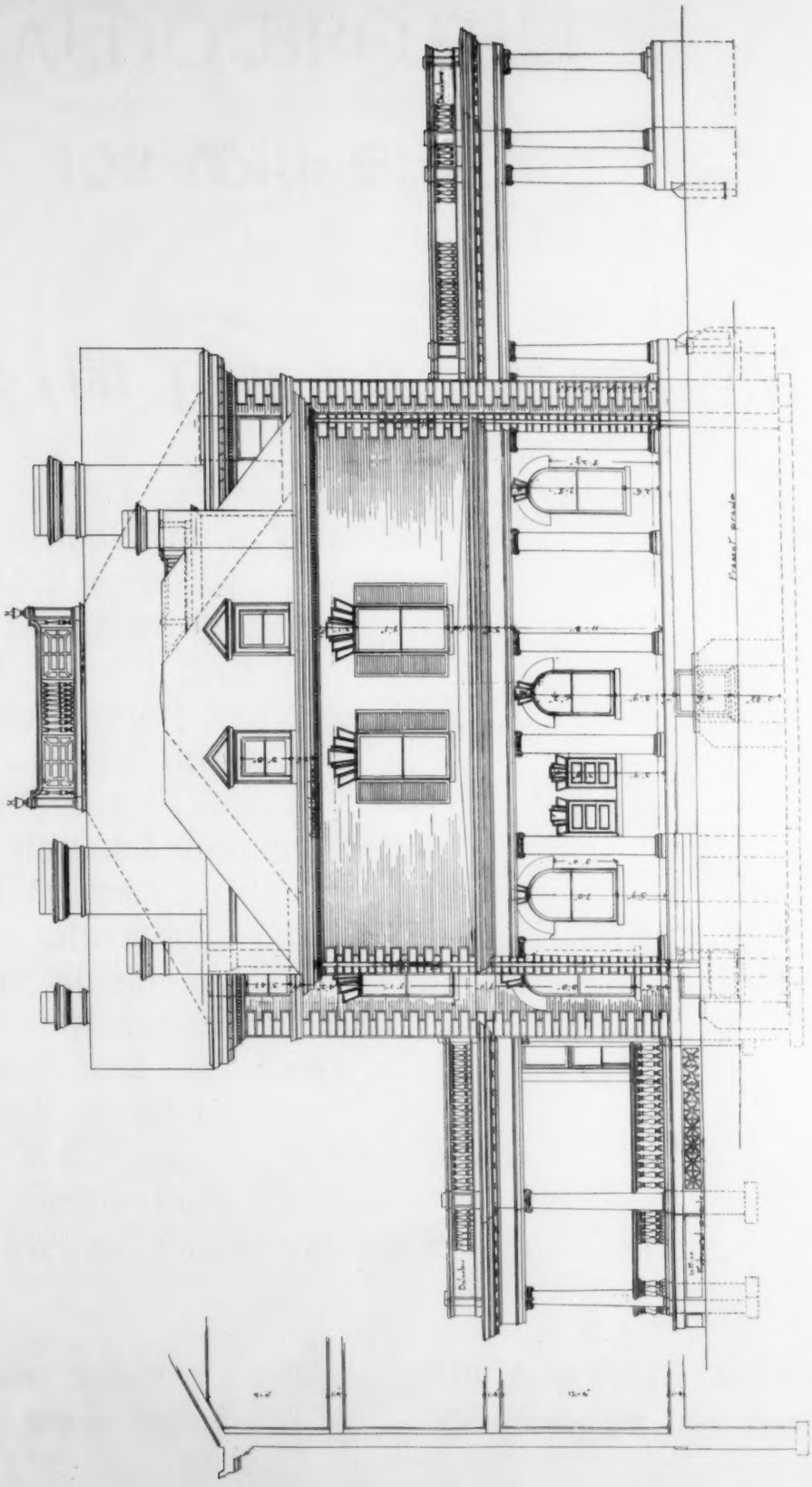


DETAIL OF CENTER RECESS, SOUTH ELEVATION.

RESIDENCE FOR FREDERICK POTTER, ESQ., SING SING, N. Y.

RENWICK, ASPINWALL & OWEN, ARCHITECTS.



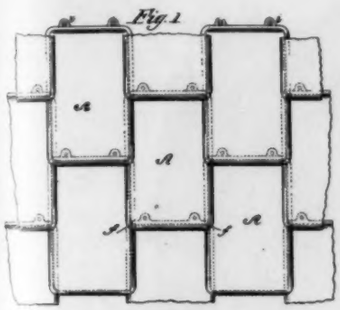


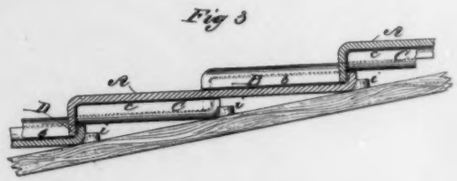
EAST ELEVATION.

RESIDENCE FOR FREDERICK POTTER, ESQ., SING SING, N. Y.

RENWICK, ASPINWALL & OWEN, ARCHITECTS.

Below we show shapes and give a description of a new form of roofing tile, which is also especially adapted to SHEATHING purposes.





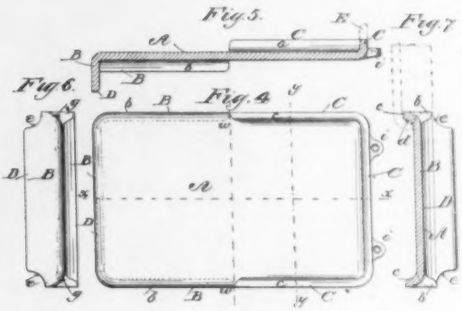


Fig. 1 is a plan view of several tiles arranged as they would be when laid upon a roof; Fig. 3, an enlarged vertical section taken on a line corresponding with *xx* in Fig. 4; Fig. 4, a plan view of a single tile drawn on the same scale as Fig. 3; Fig. 5, a sectional view of Fig. 4 at *xx;* Fig. 6 is an elevation of the lower end of the tile in Fig. 4; Fig. 7 is a cross section at *yy* of Fig. 4.

This invention relates to *clay or any other roofing tiles* of approximately rectangular form; the novelty consists in interlocking the tiles consecutively in vertical succession, composing series which lie in lines perpendicular to the eave and ridge of the roof, and then "breaking" or alternating joints between the adjacent series laterally, so that the members of each overlap at or about the middle of those adjacent.

The invention also includes certain novel features of construction of the interlocking flanges used in carrying out the said arrangement and forming tight joints for the exclusion of rain, snow, wind and dust.

In these tiles, as in those illustrated last month, *B* is a downward flange on the lower side of the tile extending about one half its perimiter below its axial line *ww; C* is an upward flange on the upper side of the tile extending in the same way above *ww; D* is a part of the flange upon the end of the tile deeper than those on the remaining sides.

The extension in depth of the flange at *D* compensates for the difference in distance or separation between the planes of adjacent tiles of common series and adjacent tiles of different series, enabling them to interlock in vertical as well as lateral succession. This is necessary, also, in order to close the horizontal joints. The said joints may also be the more securely closed by the employment of the upward-extended flange *E* in conjunction with the downward extension *D*, as aforesaid.

The parts *bbcc* of the flanges *BC* respectively interlock, as indicated at *d* in Fig. 7 herewith and in Fig. 12 in description of the Conosera shape given last month. The downward flange below the axial line is thereby adapted to overlap and interlock three adjacent tiles, and the upward flange above the axial line to interlock three other overlapping tiles.

The junctions of the corners with the sides at *f*, Fig. 1, where the flange *BC* reverse, are sealed by means of the curved edges of the extended flange *D*, which overlap and fit the rounded exteriors *g*, Fig. 6, of adjacent tiles.

In the several figures *i.i.* indicate fastening lugs, by which the tile may be secured to the superstructure.

In the Conosera pattern, illustrated in last issue, we saw that a heightening of the ornamental effect was obtained by the high relief or reveal obtained, the separation of the planes of vertically-adjacent tiles being doubled by the interposition of the edges of laterally-adjacent tiles between their ends.

In the tiles described herewith the same mechanical advantages are fully secured and by the shape a low relief or plain surface, which is especially fit for sheathing purposes.

ALL OUR SHAPES ARE FULLY PROTECTED BY LETTERS PATENT.

THE ASTORIA HOTEL, FIFTH AVENUE AND THIRTY-FOURTH STREET, NEW YORK CITY. H. J. HARDENBERGH, ARCHITECT.

Attention is called to the fact that some 61,000 cu. ft. of terra-cotta are used on this building and the Astor Court Building, seen in the distance. This includes the work made for the interior, on the ground and first floors. The total weight was about 2,200 tons, which is equal to 600 truck loads of 7,333 lbs. each.

The Brickbuilder for 1898.

PROSPECTUS.

CONTINUED ARTICLES FROM 1897.

IN announcing our work for the coming year it should be explained that some of the articles promised for 1897 have been unavoidably delayed, but that nearly all such will be published early in 1898.

The articles that have been begun, and which will be concluded during the early part of the year, are: —

THE AMERICAN SCHOOLHOUSE SERIES, BY EDMUND M. WHEELWRIGHT.

Mr. Wheelwright will furnish at least six more papers upon this subject, which will be published in consecutive issues. The full series will consist of a thorough and comprehensive treatise on schoolhouse designing and planning for the primary, grammar, high, normal, and manual training grades. Heating, ventilation, plumbing, janitor service, an analysis of the cost of schoolhouses, a digest of specifications for a brick grammar school, and the provision for recreation of pupils during recess, in Germany, France, England, and this country, will be fully considered in this series, which will be illustrated from some of the best examples of schoolhouse work in the country.

IMPORTANT PROBLEMS IN CONSTRUCTION BY WM. W. CREHORE, C. E.

Although bearing the same title, this practical and interesting series consists of independent articles, of which there remains possibly two to be published, and these will appear in the early numbers of the year.

ARCHITECTURAL TERRA-COTTA SERIES, BY THOMAS CUSACK.

Under this title, but in independent articles, Mr. Cusack will review the relationship existing between architect, engineer, and terra-cotta manufacturer; with reference to the latest phases of composite construction. In this he will have occasion to offer some suggestions, on which a common understanding may be effected, that would lead to a discontinuance of present anomalies. The illustrations will be taken from the best current work in which terra-cotta has been employed, and include drawings showing constructive details.

COLOR AS APPLIED TO ARCHITECTURE, BY E. E. GARNSEY.

Mr. Garnsey, who has spent a part of the past year in Europe studying the best examples of the use of color in architecture, will have one more paper upon this subject.

THE BRICK ARCHITECTURE OF ITALY.

Mr. W. P. P. Longfellow will contribute two more papers, each of which will consist of a description (with illustrations) of some notable examples of brick architecture in Italy.

The paper by Mr. Frank Miles Day, promised for 1897, and which will treat of Italian Brickwork, suggesting modern application, will be published during the year.

In connection with this subject it may be here stated that during the year the reprint of Street's Brick and Marble in the Middle Ages will be resumed.

While this work is taken up, owing largely to the existing obligations to our older subscribers, it will be done in a manner that will not fail to interest new subscribers. To this end a large quantity of photographs of Italian work, many of them heretofore unpublished, have been purchased from the latest collection of Valentine & Co., London, and these, with measured drawings made by draughtsmen holding Travelling Scholarships, will be used to further illustrate, and give added interest to this work.

PLATE FORM OF SCALE DRAWINGS.

The Plate Form for the coming year will be made the leading feature of our work. Carefully selected scale drawings of elevations and details of the very best work that is being done in this country will be reproduced in this form, and in addition to these there will be reproduced measured drawings of some of the best examples of colonial brickwork, especially prepared for the purpose.

New Announcements for the Year.

SUBURBAN RESIDENCE TO COST $10,000.00.

There will be begun this year a most valuable series of contributions by well-known architects, on the designing, in brick and terra-cotta, of a popular class of buildings which will include RESIDENCES, APARTMENT HOUSES, LIBRARIES, CHAPELS, CHURCHES, etc. (one of these buildings will form the basis of a series each year). It is the intention that each of these subjects shall be treated in at least two sets of articles (six articles to a set) in which the cost and conditions are varied. Each article will be suitably illustrated by elevations and plans.

The subject chosen for this year's work is a

SUBURBAN RESIDENCE TO COST $10,000.00.

The contributors will be

Walter Cope	(Cope & Stewardson)	Philadelphia.
Ralph Adams Cram . .	(Cram, Wentworth & Goodhue) .	Boston.
Edward B. Green . .	(Green & Wicks)	Buffalo.
Alfred B. Harlow . .	(Alden & Harlow)	Pittsburgh.
Charles A. Rich . . .	(Lamb & Rich)	New York.
C. F. Schweinfurth		Cleveland.

OTHER LEADING ARTICLES FOR THE YEAR.

APARTMENT HOUSE ARCHITECTURE (Illustrated), by Irving K. Pond (Pond & Pond), Chicago.

THE BONDING OF BRICKWORK, by Ernest Flagg, New York.

A SERIES OF PAPERS ON MASONRY, CEMENT, AND MORTAR, by Prof. Ira O. Baker, Champaign, Ill.

DESCRIPTION, WITH SERIES OF STANDARD DRAWINGS OF DETAILS FOR BUILDING CONSTRUCTION, by C. C. Schneider, C. E. Chief Engineer Construction Department Pencoyd Iron Works.

ESTIMATING THE COST OF BRICKWORK, based on the actual time and quantities of material used in different buildings, and

DIFFERENT WAYS OF ESTIMATING, by F. E. Kidder, Denver, Col.

FIRE-PROOFING.

In this department, which is conducted in a manner consistent with the policy of our journal, we shall furnish a series of articles by the ablest of writers, which shall treat of the advanced methods of fire-proof construction with materials of clay.

Among the writers who will contribute during the year are: —

Dankmar Adler	Chicago.
W. L. B. Jenney	Chicago.
F. C. Moore (Pres. Continental Insurance Co.)	New York.
C. T. Purdy, C. E.	New York.
Peter B. Wight	Chicago.

MASON CONTRACTOR.

In this department there will be published that class of articles which shall be alike of interest to architects and contractors.

A special effort will be made, beginning with this year, to make this department of vastly more value to this class of our readers, and to this end important questions arising from the relationship between architect and contractor will be discussed by those who have given such questions careful study.

Suggestions from our subscribers as to important questions needing practical discussion are solicited, and all such will be given due consideration.

MORTARS AND CONCRETES.

This department is maintained for the purpose of furnishing that class of material which shall be an aid to architects and builders who recognize the necessity of care in successfully employing cements. Contributors to this department will include many of the leading authorities on the subject.

RECENT BRICK AND TERRA-COTTA WORK IN AMERICAN CITIES.

We shall publish in this department letters from the larger cities which shall present in a concise and interesting manner the more important happenings in matters architectural. These letters will be illustrated from the best current work in brick and terra-cotta. That this department may become a more potent factor in our work we have recently reorganized our correspondents' corps.

EDITORIALS AND CURRENT TOPICS.

Our editorials are contributed by a staff of able writers, and by them current topics of interest will be discussed.

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